

Denver Botanic Gardens

The Green Thumb

Magazine for Rocky Mountain Gardeners

JAN. — FEB. 1962

25 CENTS



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Denver Botanic Gardens

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FEBRUARY 14, 1962, AT 6:00 P.M.

Tiffin Inn, 1730 South Colorado Boulevard

Tickets on Sale at Botanic Gardens House

909 York Street — Price: \$3.50

MAIL ORDERS ACCEPTED FREE PARKING SPACE

JAN. — FEB.
Vol. 19
No. 1

DENVER
BOTANIC GARDENS
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THE COVER

PONDEROSA PINE
Pinus ponderosa

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Denver Botanic Gardens

To conduct research on plants, both native and exotic, in varied plant zones of our region, to evaluate their economic, medicinal and horticultural potentials.
To coordinate the knowledge and experience of botanists, horticulturists and gardeners.
To educate the public in the best use of horticultural materials.
To maintain a large collection of plant species and varieties for study and display.

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REGULAR MEMBERSHIP, \$5.00; PARTICIPATING, \$10.00;
SUPPORTING, \$25.00; CONTRIBUTING, \$50.00; SUSTAIN-
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NOTES AND NOTICES

MIDWESTERN SHADE TREE CONFERENCE—The 17th annual meeting of the Midwestern Chapter, International Shade Tree Conference (formerly National Shade Tree Conference) will be held February 7-9, 1962, in the Fort Des Moines Hotel, Des Moines, Iowa, in conjunction with the 5th annual Shade Tree Disease and Insect Short Course of Iowa State University.

Registration for the convention will begin at 8:30 a.m., Wednesday, February 7, and the first paper on the educational program will be presented at 10:30 a.m. An attendance of approximately 350 members and guests is expected.

AFRICAN VIOLET SHOW—Town and Country St. Paulian Club is sponsoring Denver's 7th Annual African Violet Show on April 5th, 6th and 7th in the Colorado Room of the Lakeside Denver Dry Goods Co. at 44th and Harlan. Anyone may enter African violets on April 5th from 5:00 p.m. to 9:00 p.m. The show will be open to the public from 12:00 noon until 9:00 p.m. on the 6th and from 9:00 a.m. until 5:00 p.m. on the 7th. For information call HA. 4-5024.

COURSE IN GARDEN TECHNIQUE—It's one thing to know *what* to do to make a good garden; it's quite another thing to know *how* to do it. The extension course of the University of Colorado is designed especially for keen and more advanced gardeners who want to learn this know-how. It takes in lawn making, planting, simple grading, dry walls, rockwork, paving, fencing, spraying and even cost-estimating.

Classes are held on Wednesdays from 6:20 p.m. to 8:00 p.m. at Ninth and Birch in a building of the School of Medicine. Instructor is M. Walter Pesman, who has the unique record of having taught more garden lovers than anybody in Denver.

Registration is at the Central Office of the C.U. Extension at 14th and Arapahoe. Here is a chance to develop your own "green thumb." Classes start February 7 and finish April 4, in time to do things!

CHANGE OF ADDRESS—Please notify us if you have changed your address. It costs us 12½¢ every time *The Green Thumb* is returned and re-mailed to your new address.

FLORAL ART CLASSES—At Englewood High School—Mrs. John Scott, Instructor, Wednesday, January 24th, 7:00-9:00 p.m., Floral Art as Adapted from the Orient, Thursday, January 25th, 12:30-3:00 p.m., Playing with Posies (Arranging and Analyzing), Thursday, January 25th, 7:00-9:00 p.m., Horticulture or Gardening—Indoor and Outdoor. For information call Cal Orr's office—SU. 1-7881.

BIRD LOVERS, ATTENTION! If you would like to attract some little feathered visitors to your garden, why not tempt them with one of the nice fly-in bird feeders which are for sale at Botanic Gardens House? They are well-constructed and, if stocked with some tasty morsels of beef suet, they will provide you with winter entertainment in your garden. Price: \$1.50.

AFRICAN VIOLET SHOW—April 14 and 15 at the First National Bank of Denver, sponsored by the Rocky Mountain African Violet Council. Watch for complete details in our next issue.

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CALENDAR of EVENTS

Every Saturday Morning—9:10 a.m.

KLZ Radio. The Green Thumb
Program by Herbert Gundell,
Denver County Agent

Every Saturday Afternoon—4:30 p.m.

KLZ-TV Channel 7. The Week-end
Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE JANUARY

- 15th — Mon., 4:00 p.m., Denver Botanic
Gardens Board Meeting
- 16th — Tues., 1:00 p.m., Rocky Mountain
Area African Violet Council
- 17th — Wed., 9:30 a.m., "Fun with
Flowers" Workshop
7:30 p.m., Morning Belles Garden
Club
- 18th — Thurs., 10:00 a.m., "Around the
Seasons" Garden Club
- 19th — Fri., 2:00 p.m., The Green Thumb
Editorial Board
8:00 p.m., Colorado Garden Show
Annual Meeting
- 23rd — Tues., 1:00 p.m., Metropolitan Area
Commercial Dealers Educational
Meeting. Herbert Gundell
- 24th — Wed., 1:00 p.m., Cheesman Park
Garden Club Luncheon
7:30 p.m., Landscape Contractors
- 25th — Thurs., 1:00 p.m., Civic Garden
Club, Group A., Luncheon
- 28th — Sun., 2:00 p.m., Colorado Cacto-
philes
- 30th — Tues., 10:00 a.m., Colorado Federa-
tion of Garden Clubs Central Dis-
trict Meeting

FEBRUARY

- 1st — Thurs., 7:45 p.m., Orchid Society
- 2nd — Fri., 1:00 p.m., Civic Garden Club
Luncheon

5th — Mon., 9:30 a.m., Botanic Gardens
Junior Committee

6th — Tues., 12:30 p.m., Mountain View
Garden Club

7th — Wed., 7:30 p.m., Botany Club

8th — Thurs., 7:30 p.m., Rose Society

12th — Mon., 10:00 a.m., Judges' Council

13th — Tues., 10:00 a.m., Herbarium Study
Group

12:30 p.m., Miraflores Garden Club
Luncheon. Dr. Hildreth, Speaker

14th — Wed., 7:30 p.m., Landscape Con-
tractors

15th — Thurs., 10:00 a.m., "Around the
Seasons" Garden Club

16th — Fri., 2:00 p.m., The Green Thumb
Editorial Board

19th — Mon., 1:00 p.m., Metropolitan Area
Commercial Dealers Educational
Meeting. Herbert Gundell

20th — Tues., 12:30 p.m., Sloan's Lake
Garden Club Luncheon

21st — Wed., 9:30 a.m., "Fun with
Flowers" Workshop

25th — Sun., 2:00 p.m., Colorado
Cactophiles

26th — Mon., 7:30 p.m., Alta Vista Garden
Club

28th — Wed., 7:30 p.m., Landscape
Contractors

MARCH

1st — Thurs., 10:00 a.m., Colorado Feder-
ation of Garden Clubs State
Board Meeting

7:45 p.m., Orchid Society

5th — Mon., 9:30 a.m., Botanic Gardens
Junior Committee

6th — Tues., 12:30 p.m., Mountain View
Garden Club

7th — Wed., 7:30 p.m., Botany Club

8th — Thurs., 7:30 p.m., Rose Society

LEE CHAMBERS

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TREE SURGEON

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COMPLETE CARE AND MAINTENANCE OF TREES, SHRUBS AND EVERGREENS

PLOWS and SHEEP . . .

In the Garden of Eden

By HERBERT E. SCHWAN

Herbert E. Schwan, a graduate of the University of Montana, has had wide experience in forestry and range work in the Rocky Mountain region. When the U.S. Department of Agriculture started its foreign assistance program in the Near East in 1953, Mr. Schwan was assigned to Saudi Arabia for 14 months. He then went to Iraq where he spent nearly 3 years under the International Cooperation Administration of the U. S. Department of State. His vivid description of the sad plight of the "cradle of civilization" in another dry climate, is a forceful reminder to us that "it could happen here." (Editor)

IRAQ, the "Land of the Two Rivers," ancient Mesopotamia, is regarded by some as the beginning place of civilization. It is probable that agriculture was first practiced here.

To the Iraqis the point at the confluence of the Tigris and Euphrates is the traditional site of the Garden of Eden. Not far from here the Sumerians dug drainage and irrigation canals six thousand years ago. Babylon, whose ruins lie near Baghdad, at its height was the center of a net of irrigation canals, croplands, and orchards—the wonder of ancient chroniclers. The earliest known agricultural tools have been unearthed in northern Iraq. If we accept Old Testament accounts, sheep, goat, and camel raising was an advanced art four thousand years ago. Overgrazing and range wars seem to have been by-products. To the west of present-day Iraq, Abraham and Lot were forced to separate their herds because "the land was not able to bear them."

Iraqis told me that there were thirty million people in Babylon during the days of its glory. In 1957 there were six millions, and Babylon was truly a place where the jackals cried in the pleasant palaces, as Isaiah predicted. The same people attributed Babylon's decline and depopulation to excessive irrigation and resulting salting of the soil. Thus, in this area we have a series of reference points spanning several millenia, from which to judge the effects of man's activities on the land.

The plain between the Tigris and Euphrates is of fine silt, without a stone, and with a gradient of less than one foot per mile. It produces large quantities of dates, rice, citrus, vegetables, and other crops, but vast areas have so much salt that they are unuseable. Because the land is nearly flat, drainage and desalting will be difficult, costly, and perhaps impossible in large areas.

Northern Iraq's rolling shortgrass steppe is important for wheat farming. It is also important livestock range. Cultivation is increasing, especially with the advent of modern machinery. It is advancing into the desert and into steep and rough hill country which should remain in grass. It is also forcing livestock into more and more restricted areas on steep, erodible slopes.

The Zagros Mountains are the home of the Kurds. At lower elevations unterraced small vinyards are common. Extensive pink, barren slopes mark the land which has been abandoned because the soil is gone. The prevailing oak forest of the mountains has been reduced to open stands of mostly old, decadent trees as a result of fire, shifting cultivation, and grazing. Younger trees are repeatedly lopped and the branches dried for winter livestock feed. Reproduction of trees and shrubs are very rare, except in areas protected by the foresters, where such trees as hawthorn and wild pear are reappearing. There are some areas where good bunchgrasses remain, especially where the tribes migrate and defer range use.

The desert, home of the nomads, has suffered most. People and sheep must have water. Consequently severe grazing and destructive fuel gathering is the rule near wells. Use of outlying areas is limited by the presence of temporary water during the rainy season or by the distance water can be carried by camels. Shrubs are of great importance because they retain good protein levels through the blazing summer months. When destroyed by sheep or for fuel they are replaced by the worthless annual needlegrass known as sam'a, *Stipa tortilis*.

The sandy deserts are most productive. On most of the Western Desert, because of the destruction of vegetation, winds have removed the sands and piled them in dunes near the Euphrates. A stoney desert remains. In the south, west of Ur, there is a large sandy desert protected against severe grazing through the ages by lack of water. Here near-pristine conditions persist. The best grazing shrubs, as well as bunchgrasses and forbs, remain at nearly climax levels. Unfortunately, a program of well drilling was begun without any provision for regulating sheep numbers or managing the range.

If range condition, fodder supplies, and primitive animal husbandry practices were improved to a level prevailing in the western U. S. the number of sheep could be reduced to about one-third the present number and still produce the same amount of meat. There are immense difficulties in starting such a program, but it could be the key to range improvement and, eventually, to an increase in meat production.

Irrigated Pasture at Abu Ghraib

Left to right:

H. E. Schwan

Shepherd Boy

Sa'adun Yusef Serkahia

Head, Range

Management

Division





Mountain Slope
near the
Kurdish
town of
Penjwin

Iraq has begun to do something about its problems, using its receipts from oil to create a development fund. A study of draining and desalting part of the river plain was in progress in 1957. Foresters had begun testing and planting introduced and local tree species. Growing forage crops under irrigation was demonstrated. An extension service, to teach better farming methods, was in existence. Several large dams were under construction to bring large new areas under irrigation in the north where salting is a lesser problem. A gigantic diversion works at Samarah was completed to channel into an interior basin flood crests from the Tigris, such as the 1954 flood which came near to destroying Baghdad. Nevertheless, the restoration of forests and eroded silt-producing hill lands will be an immensely costly job, requiring several human life spans to complete.

What of the future? The pressure of human population on the land is great and is increasing throughout the Middle East. Land is limited and here history shows only too clearly that its capacity to produce food is also limited. The commendable restoration and improvement projects now in progress cannot exceed these ultimate limits. When the last marsh is drained, when the last flat acre is irrigated, when the sheep graze at a well in the farthest corner of the desert—will the history of Babylon repeat itself?

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OUR BROAD-LEAVED EVERGREENS

RUTH ASHTON NELSON

WE THINK of the semi-arid region of the Rocky Mountains, and especially of their eastern ranges, as almost devoid of broad-leaved evergreens. However when we substitute the term non-deciduous for evergreen we discover that we can include several of our native shrubs under that heading. Many of those which do hold their leaves are grayish or pale green such as the Sagebrushes and Yuccas. Others have small, finely divided and rather sparsely arranged leaves such as Apache Plume and Cliffrose (see No. V and VI of this series). But any shrubs which will hold their leaves through the winter are valuable to gardeners in this area.

There is one which has green and broad leaves that can be easily grown under general garden conditions and that is Creeping Mahonia, also called Creeping Hollygrape, *Berberis repens*, which was discussed in the first article of this series as a ground cover. Even it may turn maroon in winter instead of remaining green, if it is exposed to much sun. But it is always beautiful and its value is now quite generally recognized so it is available from several nurseries. It can be grown easily from seed or the young shoots, which



Yucca baccata and Y. glauca
in the author's garden

spread widely as soon as the plant is established, can be transplanted in early April. It is useful in many ways, especially as a ground cover in rock gardens, or between shrubs or on banks, and in foundation planting along walls.

Two other natives which are not difficult to grow but are restricted as to situation and which are truly evergreen and broad — (though small-) leaved, are Kinnikinnic, *Arctostaphylos uva-ursi* (which also was treated under the article on Ground Covers, No. I), and Myrtle-leaved Mountain-lover, *Pachystima myrsinites*. Both of these shrubs have small, thick, rich green oval leaves which persist for several seasons. Kinnikinnic is the more tolerant of the two and after being once established will withstand considerable sun in summer but needs shade or protection in winter. Great care is required to transplant it successfully from the wild, but it is now available from two or three nurseries in the Denver area.

Mountain-lover is a small shrub of the Bittersweet Family with opposite leaves and numerous, tiny, maroon, 4-petalled flowers. It requires a shaded,

moist, protected situation. Under favorable conditions it may grow to two feet in height and has a habit of spreading from underground shoots, but in my experience this has not been troublesome. It is easily layered or grown from cuttings. I have had woody twigs kept in water for several weeks form callouses, root, and grow well when planted out. It is valuable as a background in a shaded garden.

A shrub which is just becoming known to gardeners and which promises to become very popular is the Curl-leaf Mountain Mahogany, *Cercocarpus ledifolius*. It has narrow, pointed leaves an inch or less long with more or less inrolled margins which are dark green above and whitish beneath. It thrives in a sunny, dry, well-drained situation. In western Colorado and Utah where it is native it sometimes grows into a small, rigid tree, but probably it can be kept to shrub size in our gardens by careful pruning. It has inconspicuous flowers, but interesting, long-tailed seeds similar to those of our common Mountain Mahogany and is easily grown from seed.

There are two native evergreen shrubs in the Rocky Mountains which, so far as I know, have not yet been successfully grown under cultivation though attempts have been made with both of them. If some one can succeed in growing and propagating them they will be very valuable to our horticulture. One of these is the beautiful Utah Manzanita, *Arctostaphylos patula*, a relative of Kinnikinnic, which is a

spreading shrub 3 to 6 feet tall with thick, roundish leaves and smooth, reddish bark. The other is Mountain Balm, *Ceanothus velutinus*, a shrub usually not over 2 or 3 feet tall in our area and forming dense patches. Its leaves are elliptical, about 3 inches long, dark green, sticky and fragrant. It bears panicles of small, creamy-white flowers in June or early July.

In naturalistic plantings, especially in dry situations, yuccas can be used effectively to give year around greenness. In addition to the common, narrow-leaved species which is *Yucca glauca*, the Datil, *Yucca baccata*, which has broader leaves, conspicuously decorated along their margins with curled filaments, is available. *Yucca glauca* has an underground stem which spreads and produces new plants. Pieces of this stem may be planted and in a year or two will produce new plants. Datil has a more compact root system and young plants are easily transplanted. Both are easily grown from seed or from offsets.

Another non-deciduous shrub which should be more used and appreciated is the Sagebrush, *Artemisia tridentata*. This is particularly valuable in gardens planned for low maintenance requirements and can be used in very attractive combinations with those small native coniferous evergreens, the Piñon Pines and junipers.

To a gardener looking for the appropriate plants for western or mountain gardens the native species will often prove to be the solution of a problem.

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FIREPLACE WOOD



Japanese Garden, Colorado Garden Show, 1961

The 1962 Colorado Garden Show

LEW HAMMER

SPRING WILL once again come early for a large number of Rocky Mountain residents as the 1962 COLORADO GARDEN SHOW transforms the National Western Arena and Exhibit Hall into a garden paradise from March 25-April 1.

Operating as a non-profit educational exposition, the flower show is dedicated to the theme of bringing to people everywhere a greater knowledge of the growing things around us and a deeper appreciation of nature's boundless beauty that can only be found in flowering plants that surround us everywhere.

Chris Moritz has captured the atmosphere of the old South with his design of a formal garden which features statuary, lighted fountains, and more flowers than ever before used in the COLORADO GARDEN SHOW.

The Denver Botanic Gardens booth will be the plant information headquarters with information on plants at the show as well as general information for the Rocky Mountain area and will be manned by volunteers. It will be the only general plant information center at the show this year, so other plant societies have been requested to furnish more specific details on their particular interests.



Scene in 1961 Colorado Garden Show

Although those attending the show are invited to stop and “test the experts” it is understood that there will be proper encyclopedias and other reference matter available in the event that questions engulf the volunteers.

The Competitive Flower Show will be more complete than ever with a class for Men Only and a more exciting class for club participation. More information can be obtained from co-chairmen Mrs. Jess Gibson and Mrs. George Kelly.

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INTERNATIONAL FRIENDSHIP

M. WALTER PESMAN

MONACO SUGGESTS just a boulevard to most of us in Denver. It is named after a kingdom on the Mediterranean, known for the fact that its inhabitants pay no taxes. Enough income is derived from gambling at its famous Monte Carlo to take care of all the government expenses. And there is money left for scientific endeavors.

Among the latter we are particularly interested in the work done with cacti and other succulents in the Jardin Exotique, the Monaco Botanic Garden, located beautifully on a cliff next to the Mediterranean Sea. Here one can see some of the most striking tall cacti of the world, arranged in artistic display and labeled according to the best botanical practice.

On the first of September a letter came from Monaco, with a request for some thirty Colorado cacti, ranging from the rare and difficult *Coloradoa mesae-verdae* to the brilliant Beehive Cactus, *Echinocereus roemerii* and others: nine different species.

It was sent to the author of the leaflet Colorado Cacti originally published in The Green Thumb (it is still available at Botanic Gardens House). The Director of the Jardin Exotique had met the author at the Horticultural Congress in Nice, France, in 1958.

What does one do with such a request?

The Colorado Cactophiles came to the rescue, when it was found that no nurseryman or collector was able to supply these cacti in one order. This organization is made up of a group of enthusiastic lovers of cacti and other succulents. Many of the cacti requested

were being grown by members of the club. Others could be ordered from commercial collectors.

Among the latter are Mrs. Ethel Karr, 1822 Poplar Ave., Lincoln Park, Canyon City; Claude Barr, Smithwick, South Dakota; Frank Rose, Missoula, Montana, and George W. Kelly, Cottonwood Garden Shop, Littleton, Colo.

Coming to the happy ending of this unusual case of creating international friendship through cacti, the Cactophiles gathered the species from hither and yon.

By the end of the year, the collection was ready to be shipped, and the staff of the Denver Botanic Gardens air-expressed the plants to Monaco. The dormant stage, during the cold, dry winter months is the most promising time for shipment.

The Director of the Jardin Exotique assures us of their willingness to cooperate fully in this exchange of courtesies.

For your information, the Cactophiles meet regularly to discuss their prickly friends at Botanic Gardens House. Officers are: President Mary Ann Heacock, 1233 South Patton Ct., Denver; Vice-President Frank Stiles; Secretary-Treasurer Barbara Bartling; Librarian G. J. Tomlin; Educational Director Elizabeth Eckstein; Corresponding Secretary and Affiliate Representative Edgar P. Sherman, 1251 Eudora St., Denver.

So, if any of you members of the Denver Botanic Gardens want to receive a warm welcome in Monaco next time you stop in, just remind them of the Colorado Cacti, that may be thriving in the Jardin Exotique by that time.



Dr. Wyman's Spring Field Class

What the Arnold Arboretum Is

DR. DONALD WYMAN, *Horticulturist, Arnold Arboretum*

(Continued from the December issue)

PUBLICATIONS

Publications of the Arboretum are of interest to the amateur gardener, and the scientifically trained botanist, as well. "Arnoldia" is a popular periodical, appearing about twelve times a year and containing many interesting notes and studies of the thousands of ornamental woody plants growing in the Arboretum.

The more technical periodicals would include the "Journal of the Arnold Arboretum," published quarterly,

with botanical studies of many plant genera, and "Sargentia," issued at irregular intervals, which is also a series of contributions to our knowledge of the woody plants of the world. These publications are of particular interest to the trained botanist.

Hundreds of articles and many books have been written by Arboretum staff members on the subject of trees and shrubs. Just a listing of these would cover many pages of small type — too many to mention here. An actual count

shows that each year for the past 25 years, Arboretum staff members have contributed an average of 79 articles totalling 1000 pages to the various horticultural and botanical publications of the world.

CASE ESTATES

The Case Estates of the Arnold Arboretum constitute approximately 100 acres of farm land and wooded areas, given in several gifts and bequests to the Arnold Arboretum from 1944 to 1946 by the Misses Marian R. and Louisa W. Case of Weston, together with nearly a million dollars for the general purposes of the Arnold Arboretum. The Case sisters were both very interested in horticulture, and these generous bequests have made it possible to modify somewhat the general policies of the Arboretum during

the past few years. Now, most of the nurseries of the Arboretum are located on this land at Weston. Also, many plants of only minor importance horticulturally have been removed from Jamaica Plain to the Case Estates for growing permanently. This makes it possible to relieve the crowded plantings in the Arboretum proper and to give considerably more room to the better plants remaining. Also, by reducing the plant population, those remaining are given much better care. The plants removed to the Case Estates are grown in long, mechanically-cultivated nursery rows and can be seen and studied at all times by any who wish to do so.

EXPERIMENTAL HORTICULTURE

The facilities of the Arboretum also offer unique opportunities in experi-



Forsythia 'Karl Sax' originated in the Arnold Arboretum

mental horticulture, for most state or federal experiment stations place far more emphasis on studies of "economic" plants (i.e., fruits and vegetables) rather than strictly "ornamental" plants. On the Case Estates there is sufficient space to grow hundreds of azalea seedlings to test their hardiness and from which to select the better flower colors. Whenever new materials become available, whether mulches, fertilizers or weed killers, it is here that they are tried first, before jeopardizing the valued plants in permanent plantings of the Arboretum. Pruning experiments conducted here have already pointed the way to more intelligent maintenance of rhododendrons wherever they are grown, and tests are under way to provide more knowledge concerning the flowering habits of wisterias, the production of fruits by dioecious types of plants and the attempted regulation of flower, fruit and foliage colors of certain ornamental woody plants.

Photographs, color records, notes on important ornamental characteristics are continually being obtained and published from time to time, materially augmenting our knowledge of woody ornamentals as they are being grown in America today. All such information is readily available (and frequently very much in demand) to the millions of property owners throughout the country.

PLANT PROPAGATION

An extremely important phase of the work at the Arnold Arboretum has

been the propagation of these woody plants. Some unknown species must be tried by several methods in order to learn the best way to propagate them. Much information has been disseminated by the Arboretum on this subject in the past, especially with regard to those trees and shrubs which are new or difficult to reproduce.

A new greenhouse-headhouse building is being erected now, for occupancy in 1962, which includes the latest and best greenhouse equipment. Also included is a uniquely constructed (and insulated) pit house for plant storage over winter, in which it is hoped to keep an even temperature of just a few degrees above freezing for six months of the year. The information that has been accumulated here over the years in plant propagation, plus the latest modern equipment built into these propagation units, should go a long way toward opening the door to new and better ways of increasing plants.

The Arnold Arboretum, then, famous among gardeners for its year-long beauty, is no less well known among horticulturists for its many plant introductions, among nurserymen for its advances in plant propagation and among botanists for its publications, its outstanding library and herbarium and its superb living collections. Its staff today carries on the traditions and endeavors to maintain the high standards set for them by the founders of this world-famous institution.

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IS YOUR SOIL SICK?

CHAS. M. DRAGE, *Extension Horticulturist*,

COLORADO STATE UNIVERSITY

IS YOUR SOIL SICK? Do your plants lack quality or fail because of the soil? The answer to both of these questions is probably NO. Nearly 30 years ago Dr. Alvin Keezer, agronomist emeritus, Colorado State University, wrote that any Colorado soil that would produce a good crop of weeds could be made to produce a good garden. This is still sound wisdom. Soils are often wrongly blamed for plant failures.

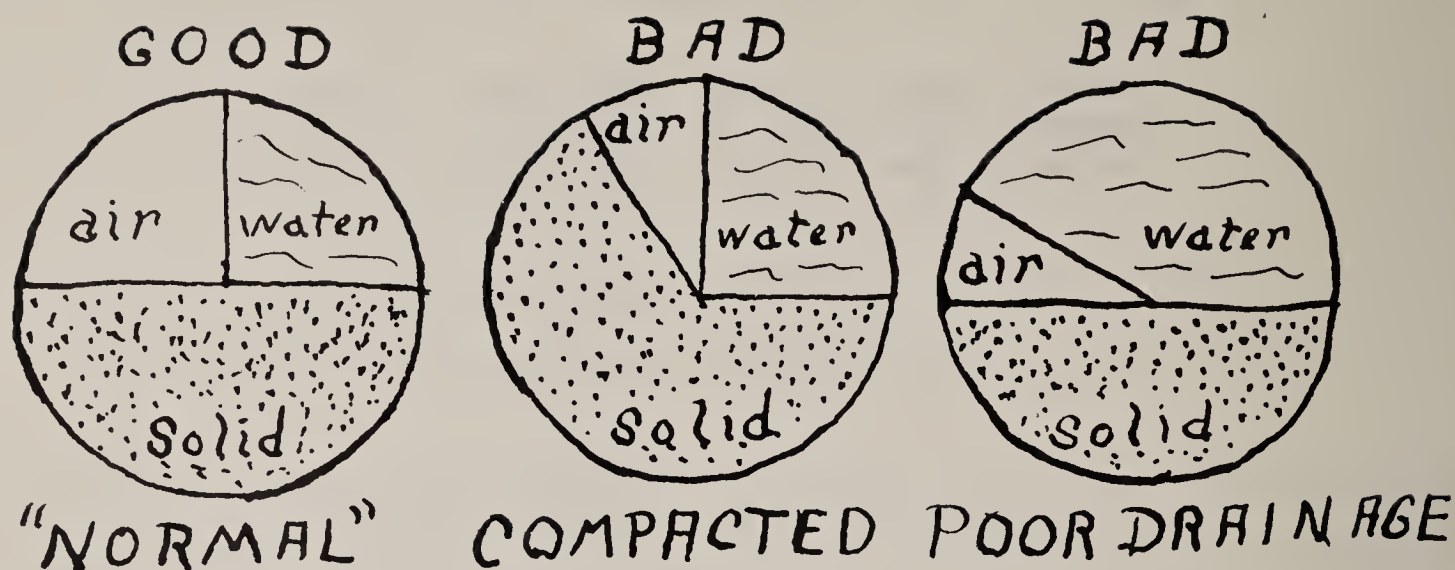
In the last few years well over 1,000 soil samples coming from Colorado gardeners have been analyzed by the Soil Testing Laboratory, Colorado State University, Fort Collins.¹ Very few of the analyses made provided information about the soil other than that which was already generally known. The majority indicated a lack of organic matter; only a few indicated a serious lack of available plant nutrients. A small number of analyses showed that total salts were high enough to cause plant injury. In a few instances, particularly for some plants, the pH was high enough to cause plant injury. The great majority of analyses indicated that plant failures or unhealthy plants had to be the result of management or of factors other than soil fertility.

In general, what do we know about our soil?

1. We know they are saline and have a high pH. Therefore, they do not need lime. Fortunately, most plants grow well in a wide pH range. The San Luis Valley is noted for high quality and yields of vegetables, potatoes and other agronomic crops. The pH is generally above 7.4 and frequently goes as high as 8.2 or 8.4. Sulfur and materials containing sulfur are used to reduce pH. On an acreage basis, cost is prohibitive and correction not permanent. When such materials are used to reduce pH, they should be purchased on the basis of the cost of the sulfur contained. Knott's "Handbook for Vegetable Growers" reports that on a clay soil 2,000 pounds of sulfur per acre is necessary to reduce the pH from 8.0 to 6.5. Some of our soils have sodium salts and are truly alkaline. When this condition exists, large quantities of gypsum must be added to the soil and the addition followed by leaching with considerable quantities of water. Leaching is not possible unless the soil is adequately drained.

2. We know that our soils are well supplied with minerals; they are largely of mineral origin. They may be deficient in the primary elements, nitrogen and phosphorus, particularly when organic content is low. The third primary element,

¹A soil analysis costs the person submitting the sample \$2.00. The actual cost to run the analysis is more than \$5.00. The difference is subsidized by the Soil Conservation Service and Colorado State University. Samples should not be sent in before instructions on taking and submitting samples have been secured from an Extension Agent.



potash, may be deficient in sandy soils. Deficiency, as used here, means amounts not adequate for maximum yield and quality. Iron, a secondary element, may not be in an available form in our highly saline soils. Plants vary tremendously between species and even varieties in their ability to use iron. Chlorosis is the primary symptom of the lack of available iron; chlorosis may be caused by other environmental conditions. In only a few instances in Colorado have we found a need to apply secondary elements other than iron.

3. We know our soils are exceedingly low in organic matter. If plenty of organic matter could be supplied (leafmolds, animal and green manures, compost, wood wastes, peatmoss, etc.), it would be doubtful if chemical fertilizers would be needed. Sandy soils need organic matter to help hold water and provide and hold available nutrients. Heavy soils need organic matter to provide and hold nutrients and to make them easier to work. When the organic matter is converted to humus by living organisms, the physical condition of the soil is improved and better tilth exists. This is because humus (a black, sticky, sweet-smelling substance) binds small clay and silt particles together and increases pore size.

4. All soils need "life," especially basement soils. It has been said that a thimble full of fertile topsoil will contain 600-million organisms. "Life" is provided by organic matter and good cultural methods. Chemical fertilizers can build organic matter and "life." The living organisms in the soil consume carbon and nitrogen when they convert organic matter into humus at a ratio of 10 to 1—10 parts carbon to 1 part nitrogen. High-quality organic matter, such as legumes, comes close to providing a perfect diet for the organisms, and when temperature and moisture conditions are optimum, conversion is swift and rapid. Low-quality organic matter, such as straw or sawdust, has a high carbon content and a low nitrogen content; therefore, it is necessary to add nitrogen for efficient and rapid conversion. The necessary organisms do not seem to care where the nitrogen comes from so long as it is available. Perhaps the greatest value of organic matter as a contribution to plant growth occurs during the conversion process.

No discussion on the subject of soils would be complete without emphasizing the importance of the physical condition of the soil. As a root undergoes respiration, oxygen, an essential nutrient, is consumed and carbon dioxide is released. Aeration is necessary so that gaseous exchange of air and soil is possible. The oxygen must move through the air spaces in the soil and then dissolve in water and enter the root. This means that the soil must have a high percentage or large

volume of pore space; a compacted soil or a poorly drained soil does not have sufficient pore space for maximum plant growth. A crusted soil will not permit oxygen to enter the pore spaces in the soil; therefore, cultivation is necessary to permit aeration as well as to control weeds.

In diagnosing plant ills, avoid quick conclusions. Don't without careful diagnosis, blame the soil; nine times out of ten you will be wrong if you do. In diagnosis, answer the following questions favorably before blaming the soil: 1) Is the plant adapted to the community and location in the yard? 2) Is the plant infested with insects or infected with disease? 3) Has the plant received too much or too little water? 4) If it was a transplanted plant, was it in condition for transplanting at time of transplanting and was it transplanted properly? 5) Are other plants competing for nutrients, water and space? 6) Is the soil so compacted that the plant is suffocating for lack of oxygen? 7) Has the plant been exposed to harmful garden chemicals?

Summary:

Soils tests, even the more thorough and reliable tests, are not generally recommended for garden soils. The physical characteristics of a soil are of equal importance to the nutrient properties. Where drainage is poor and salts accumulate, drainage is a requirement before the soil can be made productive. The poorest soil with good drainage can be made productive in a few years by incorporating large quantities of organic matter. To insure available and sufficient nutrients, work in one or two pounds of complete, low-analysis fertilizer to each 100 square feet each year. Use a complete fertilizer, high in nitrogen, for grass and leafy green crops. Use a complete fertilizer, high in phosphate, for flowers, shrubs, fruits and root and/or fruit-forming vegetables.



Color in the Winter Garden

M. WALTER PESMAN

"SOME TREES, I think, are more beautiful in winter than in summer," said my artistic tree expert. And I was glad he said it!

In explaining what he meant he pointed out the graceful silhouette that a honey locust presents in winter, as shown against the winter sky, the strong, masculine framework of a Kentucky coffee tree, and the colorful contrast winter maple branches make with our Colorado blue sky.

Perhaps we are surfeited with strong fall color when November comes and are unable to appreciate the more delicate tints of winter. Unable, sometimes, until an artistic soul points them out to us. Then, all of a sudden, we start looking around us with a fresh realization of this winter beauty.

In our gardens we might well assemble some of the best in winter color. We are fortunate in having many evergreens, both in tree form, such as blue

spruce, pinyon pine, and juniper, and also shrubs, such as Pfitzer junipers, Savin junipers, Mugho pines, and forms of Chinese junipers—all examples of evergreen conifers.

Other regions have a great many more broadleaf evergreens than we have. In the last twenty years, however, we discovered a number of this type, hardy and attractive. Oregon grape (*Mahonia*) is such a good substitute for holly, as far as leaf is concerned, that some people actually call it by that name. Its berries, however, are blue, not red. Lately two kinds of firethorn (*Pyracantha*) have become available. Both are evergreen and have brilliant scarlet-orange berries. It is best to give them a place on the east or north of a home, but I have seen them in sunnier spots and they still look happy. They will brighten up a dull corner prodigiously.

While euonymus is generally a deciduous shrub, there are two species that retain their leaves all during winter: *Euonymus kiautschovicus*, formerly called *E. patens*, growing up to four or five feet, with yellowish-green leathery leaves, and *E. fortunei*, the Sarcoxie upright euonymus, with dark-green leaves and less spreading growth. Both are attractive, but must be planted in places protected from winter sun.

Sometimes we are apt to forget that we have our native yuccas, which, after all, are evergreen and give character of a distinctive type. *Yucca glauca* and *Y. baccata* are both hardy and both have very attractive flower torches in summer.

Rhododendrons, kalmias, azaleas, hollies and most of their ilk, so much beloved by gardeners in other regions, are, alas! not for us in the arid Rocky Mountain zone. Give us time; perhaps after a hundred years or so plant breed-

ers will have succeeded in selecting a few of them that can "take" our unusual conditions. So there is hope for our grandchildren!

On the other hand, we already have a boxwood that has learned to be at home here, the Korean boxwood, *Buxus microphylla koreana*, with small leaves, light green in summer, bronzy in winter. Expensive? Yes, but remember how long it takes to grow to its twelve-inch height.

Whenever I plan for a group of evergreens in a garden, invariably the thought occurs, "What can we place in front of it to contrast with the evergreens?" And our memories jump to the red-twig dogwood and the red-twig rose (*Rosa blanda* and *R. lucida*). Red and green, in a setting of white snow—what more lovely color scheme can you think of? The related yellow-twigged dogwood is not quite so striking.

Berried shrubs are, of course, another foil for evergreens. A few of them keep their berries all during winter, such as Japanese barberry and some cotoneasters. *Cotoneaster divaricata* and *C. integerrima* have red fruit; *C. acutifolia*, black.

Other shrubs with bright berries are dependable in early winter but later become shriveled or dull. Tartarian honeysuckle loses its glamour rather early; highbush cranberry is good for a much longer time (I never *did* find out if any birds eat its berries); a number of euonymus shrubs start early and remain late with their "cardinal hats," red and yellow.

Hawthorns, likewise, differ in their retention of fruit. One of the largest-fruited ones, *Crataegus mollis*, downy haw, is fairly covered with them in late fall and then drops them in such quantities that the ground underneath is covered with a red carpet. Cockspur

thorn, *C. crus-galli*, colors later and holds on to its fruit well into winter. If you have admired the row of native haws in Washington Park, west of the skating lake, you will wonder how they can support such large quantities. They are *C. succulenta*, apparently. There are also haw plantings in the golf grounds north of Berkely Park.

Nurserymen are sure to stock Washington hawthorn, *C. phaenopyrum*, a neat low-growing tree with persistent red fruit.

Mountain ash, *Sorbus aucuparia*, is so attractive in fall with its scarlet fruit in large bunches, that we fail to remember that they don't persist all through winter.

And still there are more to be mentioned. A few, like buffalo berry, *Shepherdia argentea*, not always available, or kinnikinnick, *Arctostaphylos uva-ursi*, forgotten because it is listed in our minds as a ground cover, and a whole group of crabapples that must be known in detail to be used effectively for winter color.

Dolgo crab, to my mind, has the most attractive fruit of all and also is very ornamental for its white blossoms. So is Sargent crab. Almey crab keeps its scarlet fruit well into winter; Red Silver crab features red in leaves, flowers, and fruit. For close observation of crabapples watch the Botanic Gardens collection in City Park, south and west of Lilac Lane, and west of the Museum.

Happen to think of it, doesn't this

listing point up a serious lack of observation in most of us? When it comes to pin-pointing just when berries, twigs, and trees are at their best, we begin to hesitate. We have not trained ourselves to keen observation.

Continuing that line of thought, how many of us are aware of the shades in color of bark: yellow-green on Siberian pea, blue-green of pagoda tree (*Sophora*), golden-green of weeping willow, silvery of young Russian olive twigs, and waxy-blue of bluestem willow, just to give some illustrations. That is where the artist can teach the horticulturist.

It would not be fair to end this article on that wistful note. Artists can also help us in providing definitely strong color in the home garden in winter: tile!

Just a few bright Mexican or Italian tiles can give us a "lift" in midwinter when we get tired of white snow and dark conifers. They can be installed in your garage wall, in the patio floor, or in almost any surface that is dull and unattractive now. Roof tiles are giving color in many parts of Europe and California, why not in Colorado? You might even try two or more harmonizing tints.

Perhaps this bright bit of color will help us over the somber mood that may overcome us after Christmas is over and before the first crocus cheers us in the knowledge that spring is just around the corner.

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MR. THOMPSON

Joins Our Staff

MR. HERLEY C. THOMPSON joined the staff of the Denver Botanic Gardens on December 28, 1961. He fills the position of Botanist-Horticulturist which was vacated by Dr. James R. Feucht, who resigned June 23, 1961, to accept a position in Rutgers University, New Brunswick, New Jersey.

Mr. Thompson comes to us from Urbana, Illinois, where he was employed as research assistant in the Illinois Natural History Survey. His work there was mainly research on shade tree diseases prevalent in the Midwest.

He is a native of Kentucky, but moved to Peoria, Illinois, in 1949, where he attended high school.

From 1952 to 1956 he served in the U. S. Air Force, including three years of foreign service in England with the Air Weather Service.

He received his Bachelor of Science degree in floriculture at the University of Illinois in 1960 and his Master of Science degree in plant pathology at the same university in 1961. His experience and up-to-date training make him a valuable addition to the Denver Botanic Gardens staff. One of his im-



portant duties will be editorial work on *The Green Thumb* magazine.

Mr. Thompson has a wife, Beatrice, and three children: Diana, 3, George, 2, and John, one month. They live at 729 Race Street.

A. C. Hildreth

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The 1962 Annual Dinner

THE DENVER Botanic Gardens Annual Dinner will be held this year on February 14, at Tiffin Inn, 1730 South Colorado Boulevard. This occasion will be a continuation of a tradition that was started during the last century by the Colorado State Forestry Association. The custom was perpetuated after that association was absorbed by the Colorado Forestry and Horticulture Association in 1944. When the latter association was merged with the Denver Botanic Gardens in 1960, the annual dinner was continued as a link between the past and the future and as an annual reminder of the splendid accomplishments of the two older organizations.

Principal speaker of the evening will be Mr. T. H. Everett, Assistant Director of the New York Botanical Garden, and one of America's leading horticulturists. He was born in England and received most of his training in plant science at the famous Kew Gardens in London. The New Yorker magazine recently carried almost a full-page arti-

cle about Mr. Everett and his work. It is not often that Denverites are privileged to hear such a distinguished horticultural lecturer.

Mr. Everett is considered the leading authority on conservatories and has been serving as consultant to the Board of Trustees of the Denver Botanic Gardens in planning a conservatory for the York Street unit. In addition to speaking at the annual dinner he will devote much of his stay in Denver to going over conservatory plans with Architects Hornbein and White and with the Conservatory Committee, headed by Dr. John Durrance.

The annual dinner is open to members of the Denver Botanic Gardens and their friends and to anyone else interested in attending. Unfortunately the space is limited and only the first 250 to purchase tickets can be accommodated. Members are urged to buy their tickets early in order to avoid disappointment. Tickets may be purchased at Botanic Gardens House. (See advertisement on inside front cover.)

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? ? ? Pete Ponders ? ? ?

Dear Pete,

How long does it take to espalier a tree into a thing of beauty?

JOY FOREVER

Dear Joy,

Sooner than you'd think! Depending on the species and stage of development of the plant selected, you can display an espaliered beauty within two to four years. Few well-trained trees are obtainable in local nurseries, but the joy comes with training your own.

Dwarf fruit trees, while remaining in scale forever, require considerable time for development. Russian olive, crab-apples, and pears grow relatively fast. Dolgo crab, whose branches naturally grow directly opposite, can be coaxed from a whip to this dreamy specimen within four years.

Miss Georgia Nelson's exquisite espaliered pear, thriving on a south chimney wall, took form within two years. Although she reaped only a few pears during its early seasons, Miss Nelson happily harvests a bushel of fruit often. A word of caution—while pears are a prime subject for training by Europeans, they are seldom hardy in this area; so Miss Nelson's tree is truly a joy forever.

Dear Pete,

I'm a descendent of the ol' sod but know nary a thing about shamrocks. Can you enlighten me?

PAT O'SHAY

Dear Pat,

With your name it's an excellent question. But I can't possibly ponder shamrock until March. Right now I'm enthralled with my snowdrops.

Hmmm—Shamrock?



HOW LONG ?



FIRST SNOW DROP

Dear Pete,

We have a small garden area with room for one specimen tree not exceeding 40 feet in ultimate height. We'd like shade, beauty in form, fairly rapid growth, flowers if possible—the works!

LONE TREE

Dear Lonny,

You do want the full treatment!

Littleleaf linden, *Tilia cordata*, is my suggestion. While it needs winter protection from sunscald the first couple of years, it gives deep shade, fairly quick growth, yellow blossoms in June. One of this area's finest specimens is on Bannock street near Colfax, south of the old library building. Symmetrical, with layers of foliage and flowers, it resembles a lovely hooped skirt.

Ohio buckeye, *Aesculus glabra*, probably slower in growth than the linden, offers palmate leaves, yellow candles of blossoms, and interesting prickly-covered nuts. This tree is not recommended for barefoot gardeners.

Smaller trees boasting flowers and showy fruit with lighter shade than those previously mentioned are golden rain tree, *Koelreuteria paniculata*, with its paper lanterns, downy hawthorn, *Crataegus mollis*, with large red haws, and the little-known Chinese catalpa, *Catalpa ovata*, with its very slender pods. All prefer protected locations.



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CATALOGOMANIA

MRS. JESS GIBSON AND MRS. EDMUND WALLACE

THE SNOW BEATS at the window, the fireplace glows with welcome, and the Christmas ornaments are back on the shelf. This is the time for it . . . catalogomania. It is one fever that recurs yearly. Our imaginations are seemingly sensitized at this time by the disease. We read brochures of remedies filled with luscious examples of new flowers, shrubs, and specimen trees. At this stage of our sickness, these all seem the easiest things in the world to obtain. What a delusion!

However, this illness can result in increased beauty for every yard and garden. Catalogomania, if treated carefully, results in the chronic ailment called — gardening, which makes not only for the healthy ache of weary muscles that gardeners call good, but for the loveliness of spring, summer, and fall that every victim can make grow around him.

We find reams written about remedies to buy, but a good clinic where seed and nurserymen are the “doctors” can be a help. In cases where a consultation is needed, the landscape architects are wonderful “specialists.” Botanic Gardens has a library of the latest “antibiotics” for trying.

But from a practical “nurse,” Mrs. Jess Gibson, who has learned from experience, here are some ways that really work, cures that really help heal this mania. Take a look at some of these 1962 “pills” she has listed, and may your convalescence be sweet.

ANNUALS:

ASTERS—

Duchess by Henry Field
New Giant by Thompson and Morgan
Radiance by Burpee

LARKSPUR—

White Swan by Burpee
Flamingo by Burpee

MARIGOLD—

Orange Glow by Burpee
Penn State by Burpee
Sun Souffle by Park
Superjack by Waller

MORNING GLORY—

Wedding Bells by Dareld Decker

PETUNIA—

Can-Can by Waller
Dawn Satin by Bodger
Pink Riches by Park
Plum Dandy by Bodger

SALVIA—

Pink Rouge by Park

SNAPDRAGONS—

Hyacinth Flowered by Park
Super Jets by Burpee

SWEET PEA—

Blue Swan by Burpee
Denholm's Early
Multiflora Gigantea

ZINNIA—

Frontier by Joseph Harris
Old Mexico (All-America Selection) by
Ferry-Morse
Polynesian by Northrup King
Red Buttons by Mandeville and King
Red Man (All-America Selection) by
Burpee

PERENNIALS:

ASTER—

Alert by Walter Marx

CANNA—

Seven Dwarfs by Park

CLEMATIS—

Blue Rosette by Inter-State



Zinnia 'Red Man'



Dianthus 'Bravo'

DAHLIAS—

Early Bird by Waller
Freckles by Swan Island
Dr. P. P. Pirone by Parrella Gardens
Harvest Moon by Swan Island

CHRYSANTHEMUMS—

Hansel and Gretel by Bristol Nurseries
Minn-Autumn by U. of Minn.
Star Trail by Inter-State
Western Meadowlark by Jackson & Perkins

DIANTHUS—

Bravo (All-America Selection) by Bodger
Marcella by Jackson & Perkins

GLADIOLUS—

(In addition to the three selections for 1962 which must have been written up elsewhere)

Purple Bouquet by Hillside Gardens
Purple Radiance by Noweta Gardens
Snow White by Summit Gardens

GAGANZIA—

Fire Emerald by Park

HELENIUM—

Bruno and Butterpat by Inter-State

IRIS—

Dark Mystery by Rainbow Gardens
Dr. O. J. Seifert by E. H. Doerr
Fall Fire, First Snowfall, and Flying Repeater by Austin's Rainbow Gardens



Zinnia 'Old Mexico'



Basil 'Dark Opal'

LAVENDER—

Gray Lady by Wayside Gardens

PENSTEMON—

Henry Hybrids by Inter-State

SHASTA DAISY—

Aglaya by Inter-State

Elsie Gilbert by Henry Field

SOMETHING DIFFERENT TO TRY:

ORNAMENTAL BASIL—

Dark Opal by Ferry-Morse

The first herb to receive an All-America Selection award, grows 15 inches tall, spreads to 12 inches, attractive foliage, easy from seed.

CHRISTMAS PEPPER—

Christmas Pepper by Park

A dwarf mound of fiery pods, for pots or bedding, decorative and edible.

WAX BEGONIA—

Christmas Angel by Park

Coral-trimmed ivory balls, fifty per cent double from seed.

“NO BLAME”

OR

Highways In The Colorado Landscape

STANLEY WHITE

THERE HAS BEEN so much “to-do” about U. S. highways and the shock of their intrusion into the peaceful landscapes that *The Green Thumb* determined to get some sort of appraisal of the situation, and to give at least an opinion on the difficulties, the objectives, and especially the achievements of the last few decades by which people might judge the new look. The outcry against possible destruction of old scenes of towns and farmlands has been loud and frequently bitter, and sometimes only too often justified; but only now can the appraisal be made by any one riding halfway across the country on the new roads, all linked up, and finding them generally well done and marvelous.

The writer of this article expresses the landscape architect's point of view, since, while having no part in the actual production of the new highways, he watched the building of them very closely, as they rode gradually over Westchester County, New York, erasing his old childhood haunts of brooks and woodlands. And soon he was giving his students of landscape architecture the fundamentals of design and engineering of standard highway procedure, so that many of them went into highway design offices and into the National Park Service, and for twenty-five years were occupied in the fitting of line, grade, cross-sections, and mathematical transitions of roads to the shape of the landscape.

In spite of the common notion that engineers lay out roads and someone else mops up the distress by juggling the roadsides, the truth is that the highway in its superb form is essentially aesthetic design by designers working on engineering controls that are always present but ever complementary to the immediate terrain. Over the years the highway landscape in America can be visualized as the greatest development of landscape design, in extent, in bulk, and in effort, of any such production except town planning, in which landscape architecture, of course, exercises a very large influence. Engineers, themselves, understand this, since they have been effective partners in the government offices, such as National Park Service and Bureau of Public Roads, and have shared responsibilities, have taken landscape architects into their offices, and have adjusted their work to aesthetic and conservational design. What was at one time an old conflict of point-of-view has resolved into a general and most effective collaboration. One of the distinguished highway engineers of the 500 mile long Blue Ridge Parkway has been made an honorary member of the American Society of Landscape Architects.

But why, then, has the highway engineer been given sole responsibility by the Federal Highway Act (1956) for getting the vast system built for fifty (or eighty?) billion dollars? Public criticism has fallen largely on him as a designated professional agent. But he was assigned to the big job for the simple reason that he was the only one organized and able to get the work done. It is the point of this article to make clear that the engineer has amply justified his choice, as demonstrated by both the efficiency of his production, and by the striking improvement he has made in adopting fundamental

landscape design methods generally over the new roads. Characteristically the engineer has learned these ways of working for three reasons: 1) by virtue of his long experience with the hard facts of meeting land forms at higher speeds of vehicles, especially in rugged country; 2) by having in many cases a good eye for the flow of the road (a very personal talent); 3) by long association with landscape architects, as pioneers in road design. Many engineers are now good landscape architects.

But it has taken a century for old gridiron street patterns to make their exit, and for the landscape architect's preferred curves, like the engineer's railroad curves, to supercede the obstinate squared patterns. Historically, the new mode was introduced by landscape architects in subdivisions and parkway systems: Minneapolis, Westchester County, and New England; Washington (Memorial Highway); the Appalachians (Sky-line and Blue Ridge); Natchez Trace; and Colorado (Trail Ridge). Charles Eliot, landscape architect, produced the Boston Metropolitan Park System (1894-96) and thereby became the first "regional planner."

But engineers have meantime shown a good eye in regions like Colorado where many of the back county black-topped two-lanes have a musical line, a close fit, and a delightful flow that adds glory to mountain travel.

"No blame" is the quaint term the book of ancient Chinese writings uses for "O.K." and we may adopt it here as best expressing what should be popular acknowledgement of the State Highway Engineer's part in the glory. The old book (I CHING . . . Vol. I; p. 262,—Bollingen) says this:

"In times following a great transition everything is pressing



Colorado Mountain Highway

forward, striving in the direction of development and progress. This . . . is not good . . . and leads . . . to loss and collapse. Therefore a man of strong character does not allow himself to be infected by the general intoxication but checks his course in time . . . Not altogether untouched by the disastrous consequences . . . he is like a fox that, having crossed the water, at the last minute gets its tail wet. . . . His behavior has been correct."

The "times following a great transition" clearly applies to our perplexity in setting up the federal highway system of 1956 before we had a national policy, no less a national plan for the future historic buildings and existing towns, parks, and important scenic areas the highways would inevitably mow down in the construction of the roads.

"No blame." Well, *ours* perhaps, but, as the Chinese philosophy explains, rather the vicissitudes of time and

evolution. Real estate grabbers, hungry for unearned profit, are part of our "American Way of Life," and remember that the government furnished vast lands to the railroads, which are now screaming against subsidies for competing air-lines.

The air-lines are *new, new, new*, while railroads are *going, going, (gone?)*.

Our own Revolutionary War has been called the greatest real estate swindle in history, stoutly defended in a notable paper by Ben Franklin, Thomas Jefferson, and John Hancock. . . . No blame?

The new highways are said to save three-quarters of the statistical 40 thousand deaths per year we have long been viewing with indifferent calm. No blame? This leaves a mere theoretical 10 thousand statistical victims still looking like the mountains of skulls that shocked witnesses of old Mongolian slaughter and Aztec sacrifices. Again, "No blame?"

What is good landscape design as it shows in the highways from the point of view of landscape architecture?

It is drastically opposed to what the engineers have developed as one kind of ideal, with a giant brain, the computer, spewing out all the technical functions of line, grade, curves, and transitions from an order specifying several points in space, A, B, C, and Z on the route, and perhaps some incidental checkreins along the way to keep it from knocking out the state Capitol by accident, although the intimate scene may be ignored as sentimental, like spring loveliness and woods in autumn. At an engineers' meeting a movie was shown featuring a girl reading a book—no hands—while radar guided the car. This ultra-modern marvel had one defect; the flying machine could do it better, and would. Thus the highway of the future—no blame!—was obsolete even as it stood on the drafting board.

Three principles govern the highway as a fit-form:

1. It must have a relatively sensitive fit to the landforms, which usually reveal a scale of curvature derived from the physiography.

2. It must seek natural sites permitting the cross-slopes of the roads on curves to agree sensibly with those on the original hillsides.

3. It must seek an approximate agreement of curves in plan to curves in profile, and likewise of straights (tangents) in plan to straights in profile, if the road is to have a sinuous form. (This feature, as a principle, was published in *Landscape Architecture Quarterly* by F. L. Olmsted some forty years ago, but, strangely, it seems never to have gotten into the text-books of the engineers! No blame?)

As to the respect for landscape details by wise location of roads, where

trees, rocks, or water of elegant character may be threatened, there is the thought that natural scenery is well-nigh irreplaceable. "Roadside development" is simply post-operational patch.

Ecology, the biological-physical science treating of life under natural conditions, shows that, while plants in their own communities can rebuild the landscape in decades or in centuries after the gold dredger or the four-lane highway has gone over, the streams operate in cycles of thousands of years; and the land forms, wrought in rock, resolve only in millions of years, or aeons, back to the Laramide or Appalachian uplifts. Here we are helpless, except to refrain or to forego.

This robust fact throws down the ultimate challenge to the landscape architect's decision and explains why National Park Service roads take enormous study—someone walking the site many times before the stakes are driven, as Charles Eliot used to do,—and are the most beautiful highways in America. (See the six miles from New Found Gap down to Great Smokie.)

The writer of this article, ten years ago, was taken up Chicago Canyon to Echo Lake and discovered a wonderful rocky knob on which the little alpine coral bells had colonized in the crevices. It was an exquisite landscape, but in the building of the road it disappeared. Perhaps no blame; the general planning had to put the finger of death on this unique wonderland. But if this gem was an objective to be destroyed by giving it ready access (under 350 H.P.), why did the road have to be built?

This is simply used as a parable to point out the innumerable cases where the means destroys the end — an old story.

Summing up, we find that our fears for the landscape under the terrible

impact of progress, and our fright over the unimaginable tax of 50 billion dollars, may be allayed by the thought that the job is really being done with tremendous effect and that the landscapes of nature and culture are under the surveillance of both technical and humane understanding. To a large degree this is true by virtue of the engineer's having been so often under the influence of the landscape architect's point-of-view that in very many places the two are working in closest co-operation. Our conclusion should be, that,

in the face of many lapses that so new an art as highway engineering is heir to, a matter that this article does not presume to go into, more cooperation is called for between highway design offices carrying out the work and the effective, high-level government agencies such as the Bureau of Public Roads, the National Park Service, and many of the excellent state departments noted for their special contribution to both safety and the preservation of the landscape.



The Name Game

M. WALTER PESMAN

ONLY TEN OR FIFTEEN years ago we would have stumbled over such "outlandish" names as Nkrumah, Kibangu, Ngo Din Diem, Naguib, Njoku, and Mpi, just to mention a few. Now we are beginning to accept them.

Shying away from Latin botanical names shows a similar fear of the unusual. Once we get over such fear we find them not much more difficult than Swanson or McGruder, and most of them are certainly more easily pronounced than Krushchev.

The fact is that we can get a great deal of satisfaction out of deriving information from certain names. Here are some examples: *Solidago gigantea*, a giant goldenrod; *Opuntia fragilis*, a fragile cactus; *Penstemon gracilis*, a graceful beardtongue; *Abronia fragrans*, a fragrant prairie snowball; *Pinus edulis*, a pinyon pine with edible nuts;

Ribes alpinum, an alpine currant; *Xanthium spinosum*, a spiny cocklebur (What else would it be?); and *Eremurus robustus*, a robust foxtail-lily. What could *Cucurbita foetidissima* indicate but an extremely fetid wild gourd.

Dead-easy are the following: *Prunus americana*, *Verbena canadensis*, *Thlaspi coloradense* (It is a candytuft.), *Robinia neo-mexicana*, *Iris missouriensis*, *Tamarix gallica*, *Calochortus gunnisoni* (the mariposa lily), and *Clematis orientalis*. A little more difficult would be *Castilleja septentrionalis*, *Aster novi-belgii*, and *Baptisia australis*.

In following numbers of *The Green Thumb* you'll find this NAME GAME, as applied to easily translated designations.

What would be the meaning of grandiflorum, cordifolia, parvifolia, multiflorum, prunifolia, and filifolius?

Random Thoughts on Science and Gardeners

WHEN IT COMES to outer space, many of our youngsters can use a number of new scientific terms, almost without being taught. And yet, the average gardener shies away from some big words that are beginning to be basic for the understanding of the equally fascinating science of plant growth.

At the recent Denver Meeting of the American Association for the Advancement of Science, December 26 to December 30, important discoveries were discussed that may have a very definite bearing on successful gardening. Some of them, in fact, are already being used in everyday routine.

Transplantone is the result of scientists delving into plant vitamins, auxins, and plant substances in general.

Giberellin is a new substance that induces growth and flowering. Is it important to the plant grower in business? It will be.

Just as atom bombs are dependent on the use of a cyclotron, so plant scientists are now separating parts of the plant cell such as *chromosomes*, *nuclei*, and *ribosomes* through a machine, similar to a cyclotron, called *enuclear reactor*. What for? To find out how new plants can be created! *Phytochrome* is being talked about by these plant scientists just as glibly as space ships by aviators.

Perhaps we are just old-fashioned in our fear of new terms and we should ask our youngsters to study up on plant terminology so as to tell us how to become better gardeners. It does not take long nowadays to "get behind;" we are living so fast and scientists keep on discovering important facts that we need to know for growing better plants.

HERE IS A LIST OF OUR **NEW ROSE VARIETIES FOR 1962:**

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*Christian Dior
Hawaii
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*King's Ransom
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Orchid Masterpiece
Rose Bowl
Tanya
*All-America Selections

FLORIBUNDAS:

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BOOKS AND BOOKLETS FOR SALE

The following publications are available for purchase in the office at Botanic Gardens House, 909 York Street:

Around the Seasons by S. R. DEBOER.....	\$1.00
Colorado Evergreens by ROBERT E. MORE.....	2.50
Colorado Wild Flowers by HAROLD and RHODA ROBERTS (a museum pictorial).....	1.25
Fruit Key (identification of plants by their fruit) by WILLIAM HARLOW.....	.60
Handbook of Plants of the Colorado Front Range by WILLIAM WEBER.....	5.00
(Also available in paper bound edition).....	3.00
How to Grow Good Gardens in the Sunshine States by GEORGE KELLY.....	Spiral 3.25 Regular 3.00
Meet the Natives by M. WALTER PESMAN.....	Spiral 3.60 Regular 3.00
Planning for America's Wildlands by ARTHUR H. CARHART.....	2.50
Plants of Rocky Mountain National Park by RUTH ASHTON NELSON.....	1.10
Saga of a Forest Ranger by LEN SHOEMAKER.....	5.00
The Secret of the Green Thumb by HENRY and REBECCA NORTHEN.....	5.00
Twig Key (identification of trees and shrubs in winter) by WILLIAM HARLOW.....	.60

ARTICLES OF LASTING INTEREST TO TODAY'S GARDENER

In past issues of The Green Thumb are several articles of great interest. Copies may be obtained from Mrs. Helen Vincent at Botanic Gardens House. Among such articles are:

Lilacs for Colorado by MILTON J. KEEGAN — December, 1944.....	.10
(Beautifully illustrated)	
Flowers and Gardens of the Central City Region — July-August, 1946.....	.50
(By several authors — well illustrated)	
Hawthorns by M. WALTER PESMAN — May, 1950.....	.10
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MARCH 1962

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MARCH
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No. 2



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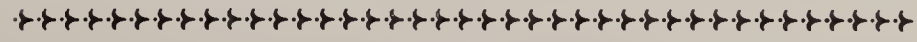
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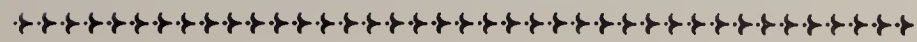
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THE COVER

Pasqueflower
Pulsatilla ludoviciana
from MEET THE NATIVES
by M. Walter Pesman



CALENDAR of EVENTS

Every Saturday Morning—9:10 a.m.

KLZ Radio. The Green Thumb
Program by Herbert Gundell,
Denver County Agent

Every Saturday Afternoon—4:30 p.m.

KLZ-TV Channel 7. The Week-end
Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE MARCH

- 1st — Thurs., 10:00 a.m., Colorado
Federation of Garden Clubs
State Board Meeting
7:45 p.m., Orchid Society
- 5th — Mon., 9:30 a.m., Denver Botanic
Gardens Junior Committee
- 6th — Tues., 12:30 p.m., Mountain View
Garden Club
- 7th — Wed., 7:30 p.m., Botany Club
- 8th — Thurs., 7:45 p.m., Rose Society
- 12th — Mon., 10:00 a.m., Judges' Council
- 13th — Tues., 10:00 a.m., Herbarium
Study Group
- 14th — Wed., 7:30 p.m., Landscape
Contractors

15th — Thurs., 10:00 a.m., "Around the
Seasons" Meeting

16th — Fri., 2:00 p.m., The Green Thumb
Editorial Board Meeting

19th — Mon., 12:30 p.m., The Green
Thumb Garden Club Meeting

20th — Tues., 1:00 p.m., Rocky Mountain
African Violet Council Meeting

21st — Wed., 9:30 a.m., "Fun with Flowers"
Workshop

23rd — Fri., 1:00 p.m., Ikabana
International Meeting

25th — Sun., 2:00 p.m., Colorado
Cactophiles

28th — Wed., 7:30 p.m., Landscape
Contractors

APRIL

2nd — Mon., 9:30 a.m., Denver Botanic
Gardens Junior Committee

3rd — Tues., 12:30 p.m., Mountain View
Garden Club

4th — Wed., 7:30 p.m., Botany Club

5th — Thurs., 7:45 p.m., Orchid Society

NOTES AND NOTICES

COLORADO GARDEN SHOW — Sunday, March 25 through Sunday, April 1 at the Stockyards Stadium. 12:00 noon to 10:00 p.m. daily. Adult admission: \$1.00. Children under 12: 50¢. Tickets are available at Botanic Gardens House.

"VIOLET TIME IN THE ROCKIES." April 14th and 15th, Saturday and Sunday from 12:00 noon to 5:00 p.m. at Botanic Gardens House. No admission charge. Public invited. This is a display of African Violets sponsored by the Rocky Mountain Area African Violet Council.

FLOWER SHOW SCHOOL — the dates have been set for Monday, Tuesday and Wednesday, April 23, 24 and 25. Watch for further details which will be announced later in *The Green Thumb*.

PLANT AUCTION AND SALE — May 25 and 26. Watch for further details in the newspapers and in *The Green Thumb*.

LEE CHAMBERS

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COMPLETE CARE AND MAINTENANCE OF TREES, SHRUBS AND EVERGREENS

TIMETABLE AND METHODS USED IN GROWING ROSES

*In the
Rocky Mountain Region*

CLYDE E. LEARNED

THIS ARTICLE ATTEMPTS to answer some of many questions asked regarding methods of growing roses in this Rocky Mountain region and also to provide a timetable for the various necessary operations. As conditions vary somewhat in the several areas of the region, the provisions applying to Denver and vicinity are being considered as average. At higher and cooler locations where roses can be grown the dates for several of the spring operations would normally be delayed one or two weeks. On the other hand, at lower and warmer altitudes, as in the Arkansas valley, the dates given would be advanced one or two weeks. Of course there are always exceptions as, for example, a protected hillside location with little wind and a lot of sun.

Instructions given are intended to apply primarily to the roses most generally planted in this region—hybrid teas, floribundas, and grandifloras. A few suggestions are offered also regarding climbing roses. The timetable is designed to start with the first operation in the rose garden in spring and to continue through the months until the rose bushes have received their final preparation for winter.

Following a normal Colorado winter, nature has pretty well made the decision as to the height of preliminary spring pruning. In these preliminary pruning operations, which are normally performed about the middle of April, the canes are cut back to sound wood (usually green in color) with a clean slanting cut just above a good eye or bud. The date of uncovering and giving the bushes their final spring pruning in Colorado, with our erratic weather, is a rather touchy subject, as most of you are aware. I will admit that I am rather reluctant to give a definite date on which these operations can be performed safely. However, to go out on a limb, my records do show that my established bushes are given their final spring pruning between the fifth and tenth of May. At that time a start is made also on removing the winter covering. Before actually uncovering the bushes, I would suggest that you get a report from the U. S. Weather Bureau as to the forecast for a week ahead, to make sure there is not going to be one of those spring freezes which sometimes do occur about the middle of May.

In pruning, try to keep the bush as shapely as possible. Remove all injured or diseased canes and all twiggy and candelabra growth. When you get through with the final pruning you will have, or hope to have, from 4 to 6 good canes which will range from 6 to 18 inches in height. Following winters as mild as that of 1960-61, it might be possible to save wood up to a 30-inch height. Keep in mind that good green canes store reserve food and that every bit of good solid wood you can save will nourish and improve the early summer growth and

flowers. All new cuts should be brushed with an asphaltic or other approved sealing compound to keep out the destructive cane borers.

The pruning of climbers is an entirely different operation, as the flowers are normally on old wood which usually lasts two to three years. Climbers are pruned about the middle of April when about one third of the old canes, together with a tangle of side shoots, are cut out. These operations require gloves.

If feasible, the final uncovering of the bushes should be performed in stages, that is, remove a portion of the protective earth cover, then a few days later remove the remainder. Some people use a gentle flow of water from a hose to remove the cover with excellent results. This final uncovering requires extreme care, as usually by this time the bushes have put out a number of tender shoots which can easily be damaged.

In planting roses in the spring, try to get the bushes in during the last week in March or the first two weeks in April. At that time the ground is in good condition to work and you have a better selection of roses at the nurseries.

If you are delayed in your planting until after the middle of May or wish to put in a rose bed during the summer, the solution is potted roses in full foliage and often in bloom. Potted roses are handled by most of our local nurseries and cost about 50¢ to 75¢ more per bush than bare-root roses. In putting in a new rose bed remember that it takes a little time for some varieties to get established, so don't get impatient if all your new roses do not produce a riot of color the first year.

When it comes to buying roses, it is well to buy from the old-line nurseries which specialize in roses or from

reliable local nurseries or seed stores, all of which guarantee their roses and will replace them if they are planted according to instruction but do not live. It is a mistake to purchase bargain roses which are usually inferior plants, culls, or the leftover dehydrated stock at the end of the season. The same is true of the so-called bench roses which are sold at a very cheap price by greenhouses at the end of the growing season.

Before doing any planting, check the drainage of the proposed bed by digging a hole about 12 inches deep and filling it with water. If at the end of 2 or 3 hours the water has seeped away, the drainage is probably satisfactory. If the water does not drain, it is suggested that you try another location or provide subdrainage, which is sometimes a rather difficult and expensive undertaking. Roses will not tolerate a location where their roots are continually wet. Sometimes you can improve the drainage by elevating the beds above the surrounding ground or by digging a deep hole for each individual rose at least 2½ feet deep and then backfilling about half the hole with coarse sand or gravel.

Be sure your roses are planted where they will be free of root competition of trees, shrubs, and other plants with spreading roots. Roots of most evergreens, especially pfitzers and upright junipers, do not spread very far and roses can often be planted very close to them with good landscape effect.

Prior to planting it is good practice to place the new bush in a tub of water for one or two hours to improve the moisture content. In the actual planting of the rose bush dig a hole about 18 inches deep and about 12 inches across, spread the roots over a conical mound in the bottom of the hole, then



The author among Denver Botanic Gardens roses.

backfill with a soil mixture, adding water, and tamp the mixture lightly but firmly around the roots. A sawed-off baseball bat makes a good implement for these tamping operations which are performed for the purpose of removing the larger air pockets. Do not pound and compact the soil to such an extent that all air is removed, as air in the soil is essential for proper growth. Keep in mind that there is not much sense in going to the trouble to excavate a good hole unless you are going to put a good plant in it. On the other hand, there is not much sense in buying a \$3.00 to \$3.50 rosebush and then putting it in a two-bit or improperly prepared hole. In my own case I try to anticipate the planting of additional roses by digging the holes the prior fall. The holes are backfilled with a carefully prepared earth mixture to which I add 2 to 3 handfuls of superphosphate well mixed in the bottom of each hole. Then, when the roses ar-

rive in the spring I re-excavate the hole and plant the rose.

In planting new roses there is always the possibility that the material taken from the hole may be so poor or sterile that it is desirable to improve it by adding peat moss, cow manure, compost, and a mixture of good garden soil. In extreme cases it may be desirable to throw away all the excavated material and backfill the hole with a mixture of about 30% peat moss, 20% cow manure or compost to which cow manure has been added, and about 50% loamy topsoil. It is also desirable to add 2 or 3 handfuls of superphosphate to the mix. We know from experience that the addition and mixing of these materials with the usual garden soil promotes aeration and results in more and better roses.

In the planting of bushes in Colorado it is recommended that the bud union be placed at the ground level or even an inch below the surface. In

the summer the spreading of a good mulch reduces cultivation and possible root injury, keeps the temperature of the ground cooler, and also conserves moisture and reduces surface evaporation. Later in this article it is recommended that at least an 8-inch winter protective cover be provided, which means that the bud union will then have good protection during the winter.

One of the most important and neglected factors in planting new bushes is to mound soil 8 to 10 inches high around the canes to prevent the new bush from becoming dehydrated by the sun and drying winds and to give the bush an opportunity to get established. The mound around the bush should be kept moist for 2 weeks or a month. When you see a number of little hair-like shoots about an inch or so in length growing out from the plant, you know that the roots have taken hold and that you can then begin to remove the earth cover.

About the fifteenth of May, or when the old or established bushes have put out a number of sprouts, apply a surface application of cow manure and about a quarter of a pound, 2 handfuls, of commercial fertilizer of about a 5-10-5 mix per bush. Apply a second application of commercial fertilizer a month later, about the middle of June. A third application about the first of August may be desirable. The fertilizer should be lightly cultivated then watered into the soil within a day or two. It would be well to avoid the use of nitrogen fertilizers after the middle of August, as the use of nitrogen tends to accelerate leaf and stem growth, with the result that you have some nice succulent shoot development which is apt to get nipped by one of the early frosts before the plants have hardened off for the winter. It is satisfactory

to use phosphorous and potash fertilizers during August and September as phosphorous develops the root system and potash hardens and strengthens the bush to withstand our winters. Many rose growers, especially those getting ready for a rose show, are enthusiastic regarding the benefits to be derived from foliar feeding. In this region the most popular of the foliar fertilizers is Rapid Gro which contains 23% nitrogen, 21% phosphoric acid, and 17% potash together with a number of minor elements. It is my opinion that foliar feeding should supplement rather than replace ground methods for fertilizing roses.

One thing is certain, attention to the soil and careful preparation of the beds and use of fertilizers makes for better roses, but to grow superior blooms, and lots of them, requires extra care and additional work.

To facilitate maintenance work it is recommended that the beds be built about 4 feet wide for 2 rows of roses or about 6 feet wide for 3 rows of roses.

Although we in Colorado are not troubled as much by insects as are rose growers in other parts of the country, it is well to begin the initial spraying or dusting rather early, usually during the last week in May, when the foliage is pretty well out. In many gardens it is necessary to spray or dust for insects about every 2 or 3 weeks during the growing season.

As there are so many first-class insecticides on the market, I shall not attempt to advise you which is best. I have used Isotox, Lindane, Malathion, Evergreen and Tri-ogen with very satisfactory results. As there is probably no perfect insecticide, it may be necessary for you to try a number until you find one that appears to give you the best control with the least amount of work.

If you are troubled with spider mites, Aramite seems to be the best protection. The use of a rather stiff spray of water with your garden hose on the underside of the leaves also helps in control of mites.

Roses require lots of water. My observations are that most sprinkling systems do not supply an adequate quantity of water to the rose bushes, which are deep-rooted plants. A canvas soil soaker or water bubbler attached to the hose usually does a satisfactory job. There is no set rule for watering roses as soil conditions in Colorado are so variable. Light sandy soils absorb lots of water and do not hold it long. In summer roses in sandy soils may need water every 3 or 4 days, but in sandy clay or loamy soils the watering interval may be up to a week. Heavy clay soils hold water and may go for periods of 2 to 3 weeks without irrigation. Usually the best guide is to dig a small hole and check the moisture content of the soil. An occasional watering during the winter, particularly in open and exposed areas, is recommended.

Ordinarily we do not have much mildew before the latter part of August; however, it does occur as early as July when conditions are right. The amount of mildew is more or less determined by atmospheric conditions and the location of the rose bed. Roses against houses or tight fences or wall or under trees or at the bottom of a slope usually have more mildew than roses which are in the open and exposed to good circulation of air. As

it is much easier to control mildew before it gets a good start, it is recommended that the mildew spraying or dusting start early or at the very first sign of the disease.

If you should happen to have any of the old-fashioned ramblers, such as 'Dorothy Perkins' or 'Crimson Rambler', watch them very closely; they are very susceptible to mildew which soon spreads to the adjacent hybrid teas and floribundas. Better still, tear them out and replace them with some of the newer and more beautiful climbers which produce several crops of flowers during the blooming season.

Fortunately we do not have much blackspot in Colorado. For mildew and blackspot control Phaltan, Acti-dione, Captan, and Karathane have proved to be very effective. Sulphur compounds, both dust and liquid, are still very popular. However, they should be applied early in the morning or late in the afternoon or when the temperature is below 80 degrees.

If you wish to have good roses, and more of them, make it a practice to remove the spent or faded blooms every day or two; otherwise, much of the energy of the plant will go into the production of seed, rather than into the development of new blooms.

Roses are usually comparatively winter hardy. Many varieties go through a moderate winter without much damage. However, in Colorado we do sometimes have a very severe winter with many wide and rapid fluctuations in temperature. The results on our roses are often disastrous if we

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do not have some kind of protection. When covering your roses for the winter, it is reasonable to assume that the greater the depth of cover the greater will be the protection to the rose bush. The result will be that you will have more live wood in the spring and usually more and better quality blooms.

For protecting roses in the winter, the usual and most common practice is to build a cone-shaped mound of earth about 8 to 10 inches high around each bush. A fairly light topsoil, free of organic matter, which drains readily provides a good protective cover. Avoid material that packs hard and becomes soggy when wet. It is suggested that the cover material be obtained from a source outside the rose bed rather than by digging material from the bed and possibly disturbing the rose roots. This cover material is normally placed during the first part of November.

For a more positive winter protection, earth filled cylinders made of hardware cloth, 4 meshes to the inch, are used. The cylinders are 6 inches high and of varying diameters, ranging from 10 to 12 inches. By using varying diameters it is possible to nest a number of cylinders to facilitate summer storage. Tinner's rivets are used to hold the ends of the hardware cloth together. *The Green Thumb* of Oct.-Nov., 1956, has a detailed article by the author on the construction of these hardware-cloth cylinders.

The object of a winter cover is not to keep the roses warm but rather to provide an insulation and keep the bushes from being damaged by sudden and rapid drops in temperature. The greatest damage to roses is caused by alternate freezing and thawing in late fall or early winter when the canes are green and full of moisture. These sudden and rapid changes are extremely harmful to the plant tissue of roses.

Hardy climbing roses such as 'Paul's Scarlet,' 'Blaze,' and 'New Dawn' have good frost endurance and normally need only a light protective cover of about 3 inches. The newer climbing hybrid tea roses such as 'Peace,' 'Crimson Glory,' and the pillar rose 'Golden Showers' are not able to withstand a really tough Colorado winter; the cane die-back is likely to be to the ground level each winter even when protected. Tree roses, even with a lot of protection, do not seem to be able to take our Colorado winters.

There seems to be more evidence each year that severe winter winds are causing more damage to our roses than the actual cold weather.

In early November, to prevent cane breakage by high winds and wet snows, it is recommended that the bushes be cut back to a 30- to 36-inch height and the tops of the canes be tied and pulled together with string. Pulling the canes together makes it easy to drop or pull the hardware cylinders down over the bush. The cylinders are then filled with soil. (It requires only half as much material to fill the cylinders as would be required for an equivalent height of mound.) After the cylinders are filled with soil, about an inch of cow manure is spread in the valleys between the cylinders.

The question of moving established rose bushes comes up every year. Nurserymen appear to agree that the best time to move the bushes is in the spring during March or April. Sometimes it is necessary to move the bushes in the late fall or early winter. The procedure then is to dig up the bush and temporarily heel it in for the winter by digging a trench about 6 to 8 inches deep and laying the bushes flat in the trench and covering completely with about a foot of soil.

◆ ◆ ◆ ◆

Attracting Birds, Then and Now

◆ ◆ ◆ ◆

CHARLOTTE A. BARBOUR

"BIRDS APPEAL STRONGLY to the interest and affection of mankind. Not only do they add charm by their graceful forms, harmonious colors, sprightly actions, and usually pleasing notes, but they have an even more important claim upon our esteem because of their great economic value. Birds feed upon practically all insect pests. They are voracious, able to move freely from place to place, and exert a steady influence in keeping down the swelling tide of insect life."

The above is quoted from Farmer's Bulletin No. 1456 compiled by E. R. Kalmbach and W. L. McAtee, issued by the U. S. Dept. of Agriculture in 1925 when chemical insecticides were virtually unused and birds were the only remedy.

That the affection, however, felt by many people for birds should manifest itself in the provision of homes and nourishment for them is highly appropriate at any date. The origin of the nest-box idea has been placed a few centuries back, but circumstantial evidence indicates a much greater age for it. This is no modern development; it is an ingrained trait in people even



of uncivilized tribes in Asia and North America.

For us "civilized tribes" as well, not only is it possible to attract numerous species of birds by supplying nesting and feeding facilities, but it has been amply proven that the actual number of birds in suburban and residential areas can be increased from one pair to ten pairs per acre.

For the person wishing to construct his own bird houses, wood is by all means the best building material. Metal



should be avoided as it is a great conductor of heat. In the choice of wood an easily workable kind should be selected such as cypress, pine, or yellow poplar, the first named being the most durable. In fact, a booklet published in 1920 by the Southern Cypress Manufacturers Association is entitled "Good Bungalows for Good Birds and Built of Cypress, the Wood Eternal." A well built bird house should be durable, rain-proof, cool, and readily accessible for cleaning. Protection from driving rain and strong winds is very important.

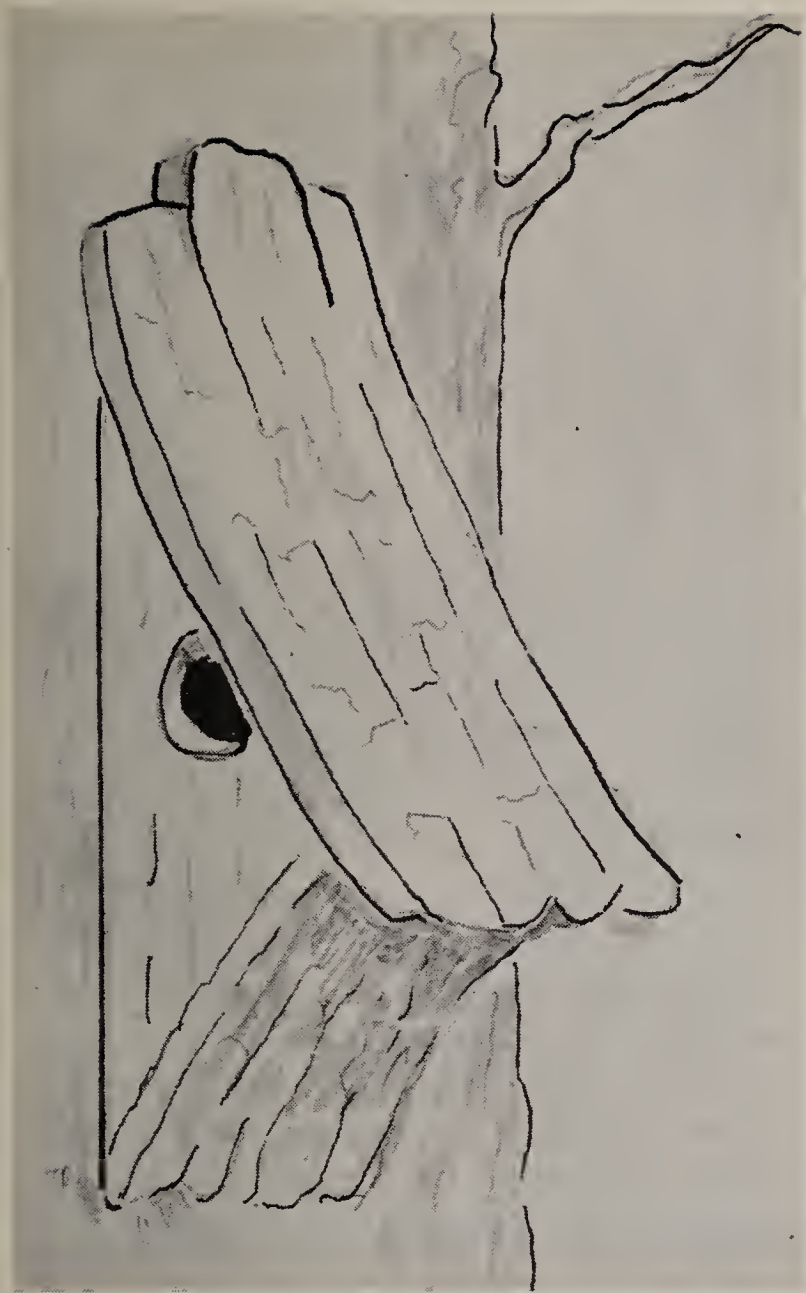
Now as to location — there are

some DON'TS: boxes placed in dense woods or shrubbery, boxes placed in trees where bird enemies can attack, boxes placed too high or too remote for access for cleaning, not too many boxes in a limited space. Houses on poles seem more acceptable as the tenants seem to consider them safer.

Birds' tastes vary and, within reason, these tastes should be catered to. Bluebirds are not particular but are partial to fruit trees and sunlight. Robins will even use nesting platforms. Chickadees, titmice, and nuthatches prefer rustic homes where the bark has been left on the wood. Wrens will use almost anything but choose boxes with a horizontal slot instead of the usual round hole. Finches like simple design in their homes. Flickers prefer a roughened interior as it permits the young to clamber up to the entrance. Other woodpeckers appreciate this, too, as well as some chips or sawdust in the bottom of the box. Experience will prove a good guide.

Birds need to have water and food on hand to persuade them to remain in or return to these pleasant homes. A water supply is especially needed in winter and should be kept from freezing. There are two sources of food,





natural, provided by planting trees, shrubs, and herbs which produce fruits and seeds relished by birds, or artificial devices exposing edible morsels such as suet, apples, peanuts, crumbs, pumpkin, sunflower, or other seeds. A variety of these devices can be homemade and can be as simple or as complicated in design as the nesting boxes themselves.

The modern trend, in 1962, emphasizes the feeding of birds in urban areas rather than the housing of same. The current Massachusetts Audubon Magazine gives no instruction on nesting boxes but offers many new ideas on feeders. There is Hyde's most popular wooden feeder, with squirrel baffle, mounted on a six foot steel post. There is a completely equipped flight deck. The birds just can't resist the

pool, playground and excellent cuisine. It is made of weatherproof Duralon with hardwood perch rails and can be attached to your window. There are suet feeders from Maine, hand knitted of strong fisherman's twine, which offer a happy source of energy and warmth for your chickadees, titmice and nuthatches. The new selective bird feeder feeds only the clinging type bird; there are no perches for sparrows, starlings, etc. It is made of red plastic, the most attracting color for birds.

Time moves on, bringing new materials and new devices into this field, but the basic idea remains that "birds appeal strongly to the interest and affection of mankind."



FOOD TRAY

Tuberous Begonias

MICHAEL ULASKI

IN RESPONSE to many interested gardeners who have been inquiring about the culture of the beautiful tuberous begonias and because of the many new people who are moving to our state, I will repeat some of the information from previous articles that have been written in this fine garden magazine.

Much of the popularity of the tuberous begonias can be attributed to the spectacular flowers. Although they have no fragrant odor, they make up for it with their dazzling beauty.

There are about five general groups of tuberous begonias. The camellia and the carnation types are the most widely grown, while the picotee and the ruffled novelties are next in line. Lately the basket or hanging varieties are being much used for hanging baskets or pots placed on brackets around the patio. Each group has a spectacular beauty all its own.

The plants may be grown from seeds, tubers, tuber divisions, or leaf cuttings. The first two means are the best and are used the most. They are popular for indoor or outdoor use.

CULTURAL POINTS

Tuberous begonias need a pH of 6.0 to 6.5; they should be protected from alkalinity. The soil should be equal parts of sharp sand, loam, well-rotted cow manure, and leafmold or peat, if leafmold is hard to get. Sterilization reduces the possibility of rot. Around a home hot water sprinkled on the soil before any planting is done

will help. Do not plant until soil becomes somewhat dry. An inch of coarse drainage material should be placed in the bottom of pots when potting up tuberous begonias. As young plants are placed in the pots, the tubers should not be covered over one-half inch. Be sure that the tubers are right side up as sometimes it is hard to tell. A 4-inch pot is a good size to use. Later the tubers can be potted into a larger pot, if that is where you will want them to grow. Generally they are planted in an open bed in the garden after the first week in June.

In summer a mulch of decomposed fibrous material applied on the surface of the bed where they are planted will keep the soil cool and will also keep it from drying out. It is well to put in a small stake by each plant at the time it is set out to support the plant later if it gets top heavy. Be cautious when putting in the stake so as not to injure the tuber or root system.

WATERING AND FEEDING

A humid atmosphere is required for tuberous begonias. However, moisture on the foliage during sunny periods causes burned spots; water on the foliage at night can bring about disease problems. Frequent watering is the rule with tuberous begonias except during dark weather. Plants should be kept uniformly moist once they have started to grow, but soil should not be soggy. It should be remembered that hanging baskets or plants kept in pots dry out quickly; drying injures begonias.

Heavy watering calls for more feeding because of leaching. Tuberous begonias require ample fertilizer to keep them looking good and healthy with lush, dark-green foliage and large, vividly colored flowers. The plants should be fed every three to four weeks with a complete fertilizer. Liquid fish fer-

tilizer is very good; it seems to produce the kind of plants desired. A windy location is detrimental to tuberous begonias. Another word of caution—do not plant out-of-doors too early; the second week in June is about right. Also, when buying your seed, tubers, or plants, get them from a reputable seed store or nursery for best results.

PROPAGATION FROM TUBERS

As tubers are started, they should be placed at a slight angle to prevent water standing around the eye of the tuber. Otherwise, it is easy for rot to get started. Tubers can be started in pots in which they are to be grown. A good starting medium is one of sand and leafmold; straight peat, sand, or spragnum can be used. Until sprouts appear on tubers, water must be given sparingly. Best propagating temperature to start tubers is 65 degrees.

PROPAGATION FROM SEED

A slower but more economical way to produce tuberous begonias is from seed. Start them in November or early December. (The author has been doing this for several years.)

For starting seed, a medium consisting of one part sand and one part finely-screened peat moss should be used. Another good medium, when screened and sterilized, consists of one-third leafmold, one-third peat moss,

and one-third sandy loam. Seeds are not to be covered. They should be placed on the medium and watered in lightly. Then the seed flats should be covered with glass and a piece of paper. Leave a little air space between the flat and the glass or the medium might mold. As the seedlings begin to emerge, which takes about ten days, gradually increase the air space and remove the paper coverings. Finally, remove the glass altogether. Seedlings can be transplanted into other flats or bulb pans as soon as they are large enough to be pricked out with tweezers.

PESTS AND DISEASES

Sterilization of the soil is the best control for diseases and pests. Earthworms can sometimes be a problem; D.D.T. or Chlordane dust on the soil controls them. Mealy bugs and red spider mites sometimes will attack begonias. Use a good spray or dust, as recommended by the manufacturer, for these insects.

STORAGE

The tubers gradually are dried for storage. When the tops have shriveled, remove the tubers carefully and store them in peat moss or dry sand at a temperature of 40 to 50 degrees. They can be stored this way for several months but should be checked occasionally.



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How To Save . . .

SUMMER FRAGRANCE

KATHRYN KALMBACH

IT IS NOT TOO EARLY to plan to save some of summer's fragrance for winter enjoyment for years to come. How? By making potpourri, a somewhat neglected but far from forgotten art. A potpourri may of course be any mixture, but for our purpose here we will think of it as a mixture of dried flower petals with spices kept in a jar for fragrance. As this article will consider our potpourri's main ingredient rose petals, we may use the term "rose jar" for brevity.

As almost everyone loves the delicate fragrance of a rose, we need to take extra care to preserve as much of this fragrance as possible when making our rose jar. Roses must be picked at the proper time of day, at the right period of development, and on the right kind of day if we are to capture a little of what is, at best, a fleeting sweetness.

Perhaps a few "don'ts" will best impress our point:

Don't pick roses while dew is on them.

Don't pick roses which are full blown.

Don't pick roses in tight bud.

Don't pick roses on a cloudy or rainy day.

Don't save rose petals from an indoor bouquet, about to fall.

Here is the affirmative side:

Pick roses about 11:30 a.m.

Pick roses on a bright summer day.

Pick roses at their peak of perfection, open but not full blown, when desirable oils which the petals contain are at their peak in the flowers.

Do I hear someone say, "But I want to enjoy my roses before pulling off the petals to make a rose jar." It does seem hard to sacrifice a number of perfect blooms for this purpose, but only in this way can we be sure of capturing the fleeting fragrance that is in each lovely petal for so short a time. And the picking is only the beginning!

Now carefully place each petal on a clean paper or cloth and lay them where they may dry away from drafts and out of the sun. I have found a bed in a little-used guest room an ideal place for their brief drying. One more word of caution . . . do not lay the petals on newspaper, as the slightest odor of printer's ink is to be avoided. In our Colorado climate petals laid to dry before noon on a bright day should be dry enough by evening of the second day, unless humidity should be unusually high. The petals must not be dried to the brittle state but only to a soft, limp consistancy.

Now the next step . . . provide a large glass or ceramic container with a tight cover in which to store each small lot of precious petals until enough have accumulated to fill the jar or jars you desire to make at summer's end. Put a layer of petals in the large con-

tainer lightly, never packed down, and sprinkle a small amount of powdered orrisroot over them. Repeat as more petals are added. Powdered orrisroot, from iris roots, is readily obtainable from any druggist for a small sum. Orrisroot has a faint, delicate odor of its own and is the best preservative of rose fragrance that I know. Gum storax and gum benzoin have also been recommended as fixatives, but they are generally harder to come by and, in my opinion, are not as satisfactory as orrisroot.

If our readers have any access to some of the old roses, the cabbage or damask roses, they have the most fragrant petals of all. Even the old Harrison yellow shrub rose has a haunting odor of its own. The author has a large Chinese jar filled with its petals with only orrisroot added. I do not recommend its use with other petals, but by itself it has a delicate fragrance that has persisted for several years.

While collecting your rose petals all summer, also dry other garden flowers to add to your potpourri for added fragrance or color. If you plan to bottle your finished product in glass containers, by all means a few dried bright blue cornflowers, sweet violets, little bright pinks, small buds from miniature roses, etc., will be a pretty addition. A few dried lavender flowers and flowers from the old-fashioned heliotrope or mignonette will add fragrance. A word of warning here—too much lavender, either flowers or oil, can overpower your roses and you will have a lavender jar instead of a rose jar!

A very important ingredient in your rose jar is the so-called essential oils, which must always be used with care but which can bring out much desired fragrance. These oils are found at your druggist's shop, usually in the prescrip-



tion department. They should be purchased in very small amounts and used with extreme care. Some of the desirable oils are bergamot, lavender, rosemary, rhodium, lemon verbena, sandalwood, and rose. There are also oils of cinnamon, cloves, anise, and peppermint for use in place of the ground spices. The so-called "flavoring oils" are nice to use in glass rose jars, where ground spices would darken the petals. Caution again—use *very* little oil, such as oil of peppermint, or your fragrant flowers will be overpowered. From long experience the author has found that a few of the fragrant oils add a delightful fillip to a rose jar, if used as follows: To one quart of petals, not packed down, use only *one* drop of each choice oil and gently shake or stir into the flower mixture. The result will be delicate and intriguing! Always use an eyedropper with your oils, as one drop too much may spoil the whole.

During the summer carefully press some of your prettiest flowers, such as pansies, violas, single pinks, little daisies, or wild roses. These can be glued facing outward inside your glass jar before filling with the potpourri mixture. For glue use the white of an

egg slightly beaten and thinned with a small amount of water. Press enough flowers and experiment a little for an effective result.

Here is a suggestion: how about a fall or winter exhibit and "sniffing" of our summer's efforts?

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EDUCATIONAL OPPORTUNITIES

for

Botanical Gardens and Arboretums¹

DR. DONALD P. WATSON
Professor of Horticulture,
MICHIGAN STATE UNIVERSITY

AMERICANS in the future will look to botanical gardens and arboretums to find well trained plantsmen. In the past many of our most adept gardeners have been trained in other countries, in countries where plant appreciation is taken for granted, where many technical schools are emphasizing horticultural skills.

The lack of appreciation of plants in the United States is appalling. The home owner is poised waiting for help. Few schools, colleges, and universities are catering directly to this demand. Consequently a great opportunity has arisen for botanical gardens and arboretums to train more plantsmen.

NEED FOR PLANT APPRECIATION

Edward Durrell Stone, the architect for the 1964 New York World's Fair, in a recent editorial has commented that America is "not so beautiful." He says that an English observer visiting this country notices "the firm determination on our part to pave our countryside with car lots, beer cans, bill boards, and honky tonk" . . . "recently a high official of the automobile industry recommended that all trees be cut out along the highways as a menace to motorists" . . . "someone else has said that in this era of prosperity and over-abundance, we seem to be able to afford everything but beauty."

In fact, until the home owner has more opportunity to become better informed, until he learns to dis-

¹A discussion presented at the Annual Meeting of American Association of Botanical Gardens and Arboretums, August 23, 1961, Hotel Leamington, Minneapolis, Minnesota.

criminate between the really fine quality evergreen and a spindly cutting, the salesman will continue to depend upon that customer's ignorance. Shall we look at how this lack of appreciation has led to an increase in the sale of artificial flowers? In the last year 24% of the wholesale value of flowers was due to the sale of artificial materials. And why won't this lead to more artificial copies of outdoor trees and shrubs? They need no water, no fertilizer, no spraying, no sunlight—all of which appeal to the ill-informed home owner. The consumer, the retailer, and the grower need the same kind of information if we are to have a well-informed consumer. There really must be no secrets.

EXISTING HORTICULTURAL EDUCATION

It is difficult to find a place to educate a plantsman. Our younger generation is growing up, going through grade school, high school, and often college, not knowing that there is an opportunity, let alone a profession, as a trained plantsman. For many it need not be a profession but there is a great need for knowing more about the culture of plants around us, perhaps merely to improve our way of life, just as there is for art or music or any other cultural subject.

A recent survey made by the American Association of Nurserymen in cooperation with the American Horticultural Society has shown that schools like the California Polytechnic Institute at Pomona and San Luis Obispo and the Long Island Agricultural Technical Institute in New York train the largest number of students in vocational ornamental horticulture, but there are only 3 out of our 50 land-grant colleges that train any large number of students in a vocational manner. Actually where do the directors of botanical gardens and arboretums look for trained plants-

men? Just where do you people find them? Is it not true that often the most suitable prospects have been trained abroad?

The four-year program for training horticulturists at these state colleges is not usually designed primarily for training plantsmen. Instead, the effort is to develop a well rounded individual with emphasis on plant science and opportunity for specialization in business, plant growth, and fundamental or applied science. The force of present international conditions has caused the training in all sciences to be jacked up and up and up, so that most universities are turning out more and more research workers, teachers, and other professors. Certainly many university graduates are scientists, not plantsmen. Since this is necessary, I don't mean to quarrel for one minute with the work the universities are doing, except to say that sometimes advanced degrees are gained at the expense of practical experience. Frequently the best graduates of universities are those who have had some early training with nurseries, parks, gardens, or landscape contractors.

The lack of trained plantsmen combined with the doubling of leisure time in the last 50 years, the building of millions of new homes, and the increasing numbers of uninformed suburbanites promises a brilliant future for trained plantsmen. The home owner is starved for just the kind of information that botanical gardens and arboretums are prepared to supply.

SUGGESTIONS FOR EDUCATIONAL PROGRAMS

It seems logical that this training will be provided by botanical gardens and arboretums, because it is the history of their performance to have arranged an adaptation to suit the need.

Through the middle ages their work

was chiefly with medicinal plants. In the sixteenth and seventeenth centuries emphasis was placed on building plant collections. In the eighteenth and nineteenth centuries the tendency was to move toward the sciences emphasizing more work in anatomy, morphology, paleontology, ecology, physiology, etc. In the twentieth century the trend has been to move more toward the physical chemistry, biochemistry, plant chemistry, biology, pathology, statistics, and so on. Yes, it has been a history of a superior performance guided to satisfy a need. Probably the era of the highest prestige for a professional gardener was reached in France at the time of Louis XVI; but in all ages the need for the satisfactions that arise from the practices of gardening was never higher than in the U.S. today.

More large estates are becoming available, some with specification that they are to be of service to the public. Administrators of these gardens cannot stand aloof and hold court with their dead specimens in museums. Nor can they sit and wait for the people to arrive. They are dealing with life. They must take the clutter from their stock room and produce a show window like a fine jeweler with an ever changing display of a choice few flowering rubies, emeralds, and diamonds. The public garden must serve more than the few people who will search on their hands and knees to find the labels and it must respond to the demand of the large number of people who want answers and don't know where to find them.

Plant people have always been modest, but today, they are going to have to stand up and "holler" if they are going to be heard. They are going to have to make artistic and adaptive demonstrations. We cannot just sit and be idealists in a world that is dominated

by business. We are going to have to adapt our programs to suit the public the way that it has been done at the Desert Botanical Garden in Tempe, the Los Angeles State and County Arboretum, the Brooklyn Botanic Gardens, and elsewhere.

Of all the opportunities, mass communication is probably the most important; and of the various forms of communication, television has more to offer than is realized, especially by those who are not regular viewers of television. It is possible for you to understand the size and type of ready-made personal audiences that are available, especially if you consider people in modest homes with children who would not normally see a botanic garden. It is easier to demonstrate how to prune a tree in front of the television camera, than to try to do it with a descriptive leaflet.

We shall see the day when many botanical gardens and arboretums have outdoor garden television studios with patios that are built for cameras, where there will be lawn demonstrations on sodding compared to seeding, where the color camera will bring into focus and share some of the greatest beauty in the world. And this cannot be done by professional actors. It is going to have to be done by people who know plants, people who are plantsmen, and then trained to perform before the camera. There may be TV demonstrations in horticultural therapy with assistance provided by garden clubs. Much of this garden programming will be in close association with music, drama, birds — any good quality performance. Plants in many ways are just as close to arts and social sciences as they are to the sciences of chemistry and physics. There will be demonstrations on garden lighting; there will be turf plots, patios, and ground covers.

The success of every botanic garden will depend on its originality and its adaptation to the local demands. Other means of communication must not be neglected or discontinued, but television has not been used as widely as it might be.

Now you are going to say, "Well, this is all right for Watson to say. He has elaborate ideas, but does he think there are unlimited finances and most of us don't already have enough to do. Most of us are not primarily educators and we have had such terrific increases in our costs of operation."

But I shall answer that many of you are operating tax supported institutions, institutions that have an obligation to serve the public. I will answer that through this service some of the programs can become self-supporting. I know of a fine work at Indiana University where Dr. Shaluka trains teachers to teach gardening to children from the city schools. After having done this for some time, she is now receiving financial support from the city. Television can be made to show a profit. It does not necessarily need to detract from any horticultural program to have it profitable. On the contrary, when it becomes too inexpensive or, more often, free it is rarely completely appreciated. One of the greatest criticisms of plantsmen today is their willingness to do too much for nothing. This, in itself, makes them less appreciated.

The survey by the American Horticultural Society and the American Association of Nurserymen has shown

that the following institutions are offering some courses to the public:

Arnold Arboretum, Jamaica Plain, Mass.
Barnes Foundation Arboretum, Merion Station, Pa.
Botanic Garden, Smith College, Northampton, Mass.
Brooklyn Botanic Garden, Brooklyn, N.Y.
Denver Botanic Gardens, Denver, Colorado
Descanso Gardens, La Canada, California
Desert Botanical Garden, Tempe, Arizona
Fairchild Tropical Garden, Miami, Florida
Hamilton Botanic Garden, Hamilton, Ontario, Canada
Longwood Gardens, Kennett Square, Pa.
Los Angeles City and County Arboretum, Arcadia, California
New York Botanical Garden, Bronx, N.Y.
Missouri Botanical Garden, St. Louis, Mo.
Phipps Conservatory, Pittsburgh, Pa.
Santa Barbara Botanic Gardens, Santa Barbara, California
Virginia Polytechnic Institute, Blacksburg, Va.
University of Washington Arboretum, Seattle, Wash.

Some of these courses are strong and attract large numbers. Some of them are small, but all together you see, this is not a drop in the bucket. These courses are popular but a small contribution compared to the technical schools, professional schools and revered garden institutions that are found in most countries.

In conclusion, let me emphasize that in the future on top of maintaining plant collections, plant introductions, gardens, parks, plant breeding, botanical research and many other responsibilities, we are going to have to think about accepting an opportunity to also serve our plant-starved millions with inspirational demonstrations, with streamlined techniques of education.

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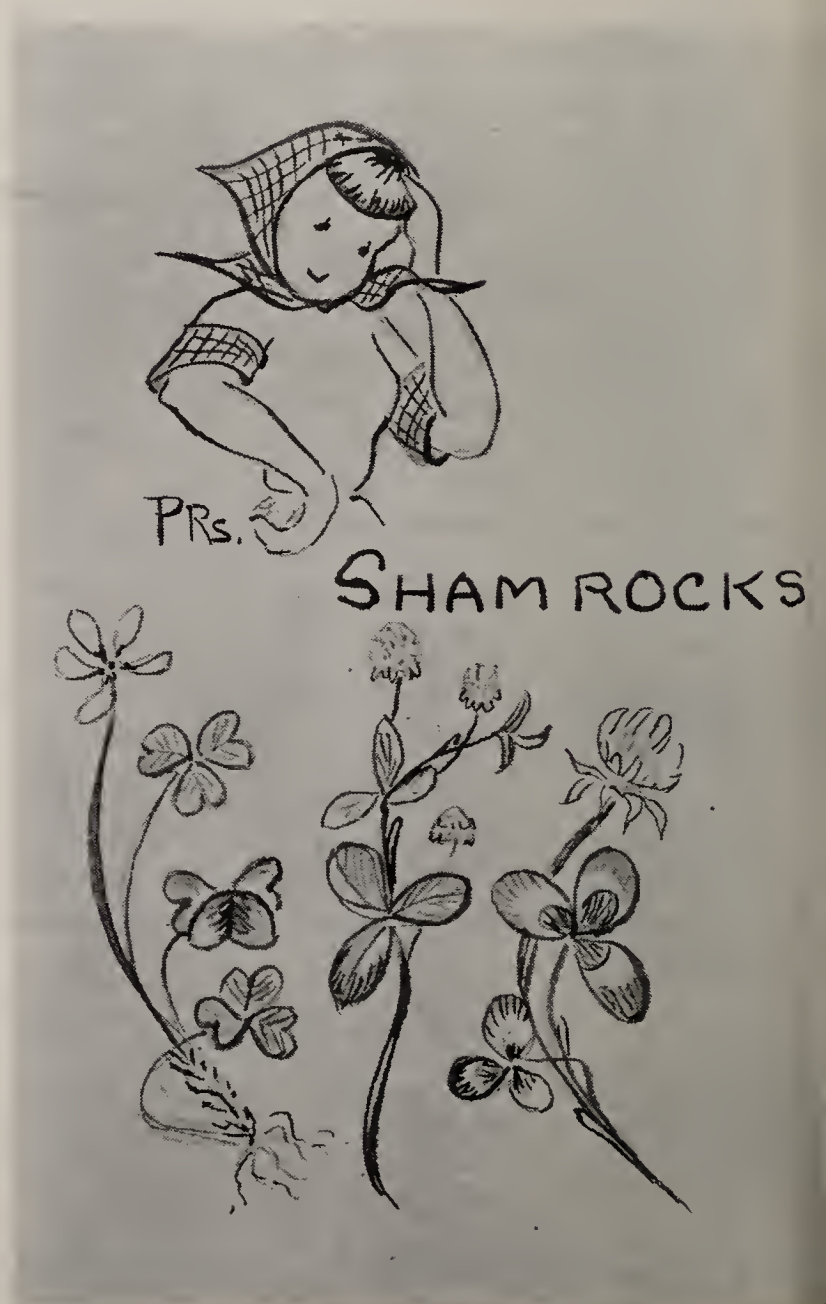
Dear Pat,

When you explained you are a descendant of the old sod but know “nary a thing about shamrock” you’re typically Irish.

Mike O’Pesman facetiously explains that the predominating characteristics of shamrock are that they must be green and have at least three leaflets. From here on, even your ancestors disagree. Many favor wood-sorrel, *Oxalis acetosella*, which is in perfection on St. Patrick’s day. On the other hand, white clover, *Trifolium repens*, is the plant most commonly used in Ireland and sold in the United States as shamrock.

One source declares the yellow-flowered clover, *Trifolium minus*, is the one worn by Irish soldiers in honor of the gallantry of their countrymen in the South African war. Some say water-cress is the true shamrock, while others argue for hop clover, *Medicago lupulina*.

Are you enlightened? Personally, I’m the first woman candidate for orbiting the earth.



Dear Pete,

I'm a sentimentalist. Will edelweiss grow here?

SWISS MISS

Dear Swiss Miss,

As one sentimentalist to another, Swiss Mister Herb Gundell reports edelweiss grown both from seed and from plants has successfully survived one winter in his rockery. He cautions the plant will not survive with excessive moisture around the roots but prefers a habitat similar to that in the Alps. There, growing in a nook or cranny in rocky soil, exposed to sun and weather, the soft greyish, star-shaped flowers with their velvety, greyish-white foliage will flourish. *Leontopodium alpinum*, the only cultivated species, is sometimes sold as *Gnaphalium leontopodium*.

Miss your Swiss plant no longer. It's worth a try.



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Colorado Nurserymen's and Arborists' Short Course

ABOUT 200 PEOPLE interested in horticulture attended this very fine session on January 29-30, 1962, on the Colorado State University campus. It was one of the best short courses yet presented since these meetings were first held. The program was well balanced and there was something in it for everyone.

This annual short course is held during a slack period and therefore presents a wonderful opportunity for all of those interested to obtain the latest word from the horticultural world.

Here are the highlights of this year's program:

1) Control and prevention of shade tree diseases has progressed to the point that the controls are becoming more specific than general. Much research is being done on fire-blight control, but as yet there is no definite cure or prevention.

2) It appears that garden centers must be operated as efficiently as other retail stores if they are to be successful. This will necessitate top-notch management.

3) The importance of giving correct information to the uninformed public by those people in the horticultural industry was stressed by many speakers.

4) The value of the development of the Denver Botanic Gardens was stressed; research done there will be of great value to the entire Rocky Mountain region.

5) Common Kentucky bluegrass, it seems, is still our best grass for most turf areas.

6) The use of adapted plants was stressed. With any crop, whether it be beans or trees, it is yield we are seeking. To achieve the greatest yield, correct and proper location of adapted material is of great importance.

7) The second annual Colorado Nurserymen's Association award of \$100 for an outstanding contribution to the field of horticulture or to the nursery industry was awarded to Mr. S. R. DeBoer, landscape architect.

The annual convention of the American Association of Nurserymen is to be held in the Denver Hilton in July of this year.

Everyone is looking forward to the 1963 meeting of the Colorado Nurserymen's and Arborists' Short Course in the beautiful new, and by then completed, Student Union on the C.S.U. campus.

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ONE'S A KNOCKOUT!

MRS. JOHN SCOTT

A KNOCKOUT connotes curtains for any aspiring contender. And that's what the two All-America garden chrysanthemums for 1962, Knockout and Flameburst, have done — knocked out the runners-up for the red, white, and blue plant tag, worn by every All-America Mum Selections winner.

All-America Mum Selections, which is a non-profit testing and rating institution, started comparative tests of new chrysanthemum varieties in 1954. It entails, in part, the efforts of twenty chrysanthemum judges in as many trial gardens throughout the United States. Flameburst and Knockout earned their top awards along with winners of previous years, starting backward with Her Majesty, white decorative, Bingo, rich, red cushion, and Apricot Sheen, cactus flowered cushion, 1961; Headliner, coral decorative, Mardi Gras, red and gold cactus, and Pink Cherub, purplish pink pompon cushion, 1960. Before this there were Girl Friend, a coral rose, Burning Bronze and rosy Showpiece, all decoratives, and Crimson Lady, lavender Flair, and yellow Emperor, all cushions.

Knockout is a cushion chrysanthemum, a type sometimes called "azalea." The All-America Mum Selections state that Knockout is a low grower, suddenly bursts into a blanket of small orchid or rose-pink blooms, and completely covers the uniform plant spread of hardly a foot tall, in early October.



Flameburst,
1962 All-America
Mum Selections

Flameburst flowers in September, a month earlier than Knockout. The Flameburst judges say it continues blooming through to hard freezing time in the north and central sections. This decorative type grows vigorously to over two feet, has a bushy spread, profuse blooms of coral red on long, wiry stems, excellent for either cutting or displaying in the garden. Flameburst boasts a rich and exciting new coloring, its unique quality.

Exciting is the word for these two 1962 plant introductions. Try them, at least one of each. Then if they live up to their press releases in this area and under your care you can propagate more another year. It's easy.

In the meantime, "Growing Chrysanthemums in the Home Garden," or Bulletin No. 65, is available from your County Extension Office. And these books *Chrysanthemums for Everybody* by Fred Loads, *Chrysanthemums for Pleasure* by Ernest and Aleita Scott, *Chrysanthemums in Pictures* by John Woolman, *Greenhouse and Garden Chrysanthemums* by D. C. Kiplinger, *Hardy Chrysanthemums* by Alex Cummings, and *The Complete Book of Chrysanthemums* by Cornelius Ackerson, are recommended by the National Chrysanthemum Society, which has many members in this area.

Why not become a member of the National Chrysanthemum Society? Mail \$4.00 to Miss Dorothy P. Tuthill, Secretary, 345 Milton Road, Rye, New York. The membership fee also brings six large, newsy bulletins a year and other timely tips, like a recent report covering a ten state area, including Colorado, pointing to the rise of the chrysanthemum's popularity.

Al Voigt of Penn State Extension Service says, "The number one cut flower crop in the nation is mums, including both pompons and standards. Ten years ago they were third, behind roses and carnations. A tremendous demand rate exactly doubled the wholesale value of mums in ten years—the mum growth in the last decade was accomplished without direct promotion by any 'mum trade association.' Consumers and retailers, therefore, must have decided all by themselves that they liked mums." (This same report placed carnations second, roses third, and gladioli fourth.)

Chrysanthemums are the queen of all fall flowers! Flameburst and Knockout are the queen's newest attendants.



Knockout,
1962
All-America
Mum Selections

ARE YOU ACQUAINTED

with

DWARF FRUIT TREES?

GUY FOX

IF YOU HAVE the urge to pick apples and peaches from your own trees, you should become acquainted with the dwarf fruit trees. They seem to be made to order for the city or suburban dweller. We say "*seem* to be made to order" because their dependability has not yet been fully established for the Denver area.

First, let us look at them. They vary in size, but true dwarf apple trees will be about one-fourth the size of standard trees, about 6 to 8 feet high. Dwarfs can be planted 10 feet apart. Espaliered against a fence, they can be planted even closer. They are ideal for espaliering against a building.

Because dwarf trees are so small, pruning, spraying, and picking the fruit are relatively easy for the home gardener. Moreover, several varieties of dwarf apple trees can be grown readily in the average city lot. This means opportunity for cross-pollination and the possibility of picking ripe apples from your trees from July to October and of storing late keepers well into the winter. This means, also, many different flavors and both good eating and good cooking apples.

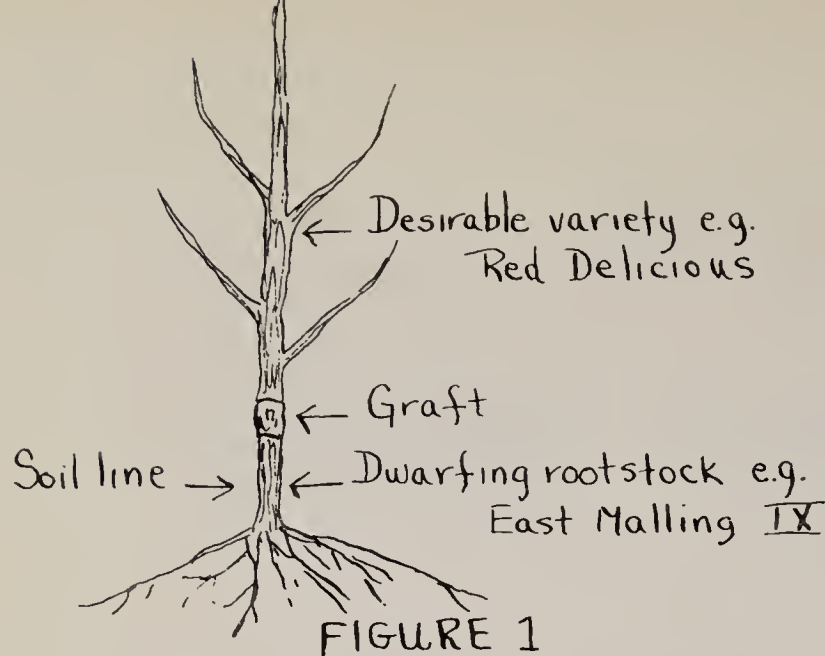
Another important advantage of dwarfs is that they fruit early. While standard apple trees usually require 6 years or more to come into bearing, dwarfs often begin fruiting the second year after planting. However, much depends upon the care they receive and the conditions under which they are grown.

Why haven't we heard more about these wonderful little trees? Let us look briefly into their history.

We are told that Chinese, Japanese, and Europeans have grown dwarf fruit trees for centuries. But until recently there was considerable secrecy and much confusion relative to materials and techniques used. In the flurry of interest in dwarfs that took place in America during the first quarter of this century the buyer was never certain what he was getting. Consequently many failures resulted.

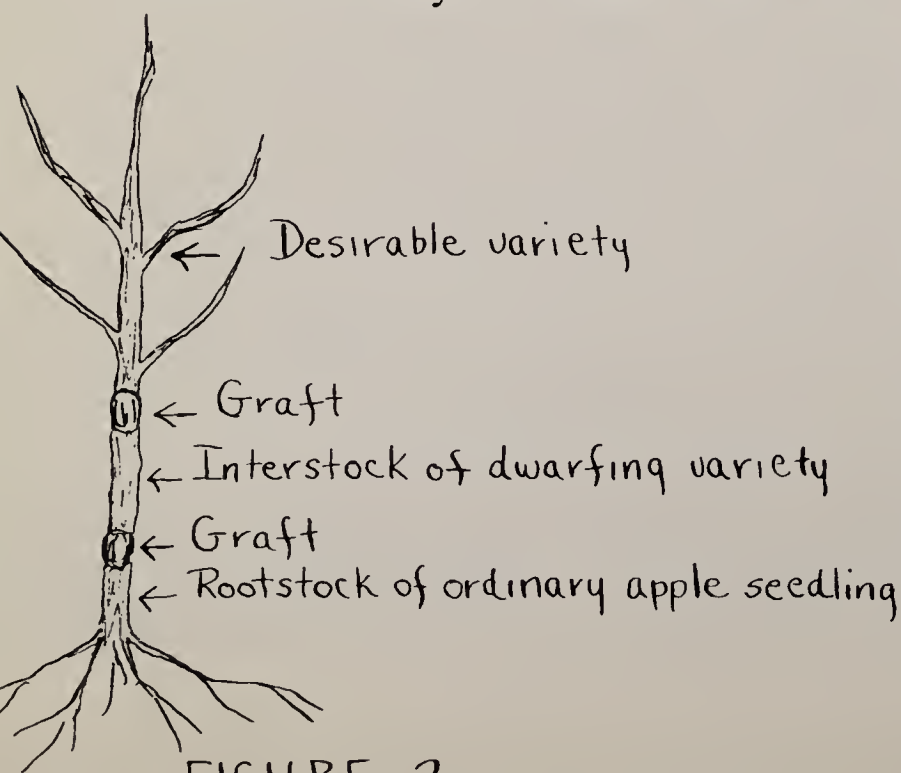
In 1912 studies were begun at East Malling, England, that resulted in the standardization of a number of rootstocks useful in dwarfing. It was in 1938 that this standardization was completed and officially adopted. That wasn't very long ago; but, since then, rapid progress has been taking place, both in improving the product and in developing mass production methods.

How are dwarf fruit trees produced? In the production of dwarf apple trees there are at least three principal techniques. The earliest method, still commonly used, was grafting or budding a desirable variety of apple directly to a dwarfing rootstock, for example, 'Red Delicious' to 'East Malling IX' rootstock. (See Figure 1.) In using dwarfs produced in this fashion, one must be careful not to let the soil cover the graft. If the upper part of the tree gets a chance to put down its own roots, the dwarfing control is lost.



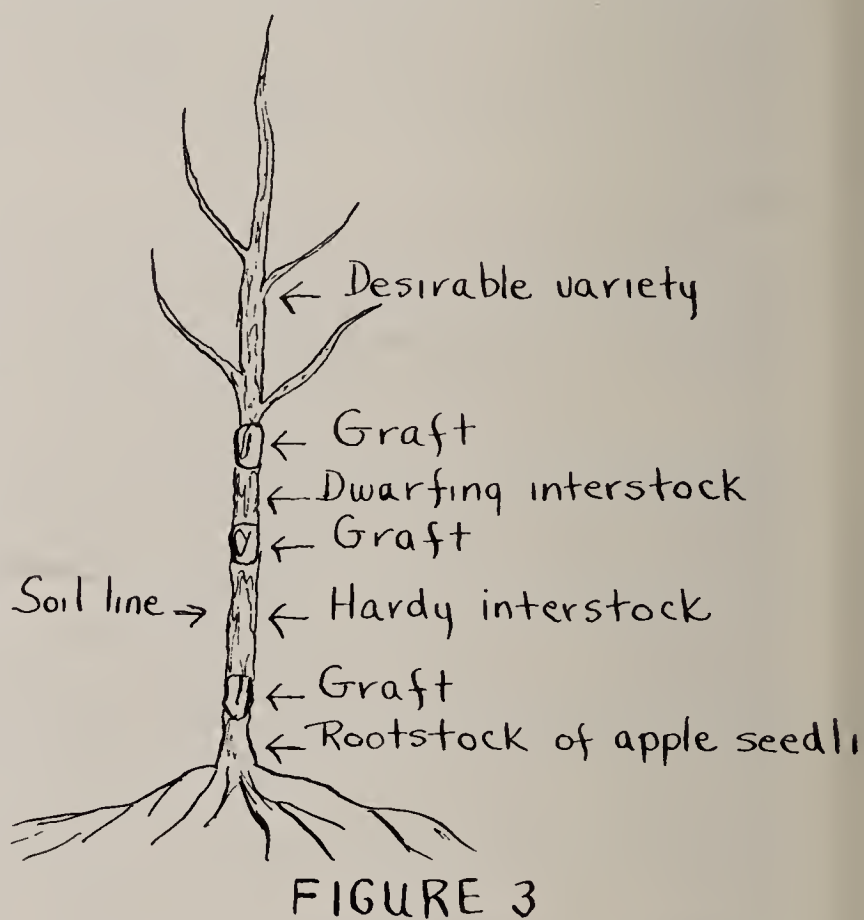
In the second method it was discovered that instead of using the root and stem of a dwarfing variety, such as 'East Malling IX,' a branch or scion from an 'East Malling IX' apple tree could be grafted to the rootstock of an ordinary apple seedling and allowed to grow for a year. Then if a scion or bud from a desirable variety, such as 'Delicious', is grafted to this new stem or interstock, this 5- or 6-inch interstock will still control the growth of the top and produce a dwarf, a little larger this time, but still only about one-third the size of the standard tree. (See Figure 2.) This method can provide a better root system and a stronger trunk with less danger of the dwarfing control being lost.

The third technique, sometimes called the Clark method, involves 3 grafts and parts from 4 different trees. (See Figure 3.) The theory here is that the tree starts growing on the seedling roots but will also put out roots from the hardy interstock which is



planted partially below the soil line. The end product will be a deep-rooted tree on a hardy rootstock. There is no danger here of soil contacting the variety at the top, hence, no danger of losing the dwarfing control. Obviously this tree takes longer to produce.

How about other fruits such as pears and peaches? The same principles apply here as with apples. The problem in each case is to find a desirable dwarf type of fruit tree or shrub compatible with the variety that one wishes



to dwarf, so that they may be combined by grafting or budding.

For pears, which have no dwarfing types in their genus, a certain type of quince makes an acceptable dwarfing rootstock. For peaches, the Nanking cherry and the western sand cherry have been used for dwarfing. In the case of cherries, there are two natural dwarfs that seem to be giving satisfaction, 'Meteor' and 'North Star'. The author has had a 'North Star' cherry for eight years. It is about 7 feet high now and has been bearing heavily for 4 or 5 years.

What's happening in the dwarf fruit tree field? Their popularity seems to be growing rapidly. More and more nurserymen are adding them to their stock. One writer recently estimated that some two million dwarf fruit trees are now sold each year in America to commercial orchardists and home gardeners.

So enthusiastic are some home gardeners becoming that they are predicting that when these horticultural marvels become better known and their relatively simple care is understood, the number of amateur fruit growers will rival the number of rose-growing enthusiasts. When that day comes, maybe we'll have an organized group of amateur fruit growers similar to the now well established American Rose Society.

CHECKING UP ON DWARF FRUIT TREES

The evidence seems clear that for the average city or suburban dweller dwarf fruit trees, where they grow successfully, have many advantages over the standard trees:

1. They require little space. (This makes possible several trees on an ordinary city lot thus providing cross-pollination, summer, fall and winter fruit, and a variety of flavors.)
2. They are easy to prune, spray, and pick.
3. They fruit early, sometimes the second year after planting.
4. They bear a quantity of fruit more suited to the needs of the average family.

But will they do well in this region? We want data from those who are trying them; we need more than one or two experiences. We have examples of plants that have been tried here, pronounced failures and unadapted to this environment, and yet, later, we find them being widely used with good success.

There are many factors involved in the success or failure of plants such as dwarf fruit trees. Much also depends upon the care they receive. Karl Brase, Associate Professor at the New York State Experiment Station, Geneva, New York, is on record as saying, "McIntosh apple on EM IX rootstock has survived winter temperatures as low as —31 degrees. Cultural conditions such as over-fertilization and clean cultivation around the tree, causing late growth during late summer and early fall, are often responsible for winter injury to the tree rather than the rootstock itself."*

Again, consider the need for cross-pollination. Some varieties of fruit trees must have it if they are to bear. But some people are not aware of this. They buy a single apple tree and pronounce it a failure when it doesn't produce fruit.

What kind of data do we need? These questions will illustrate: From what nursery were the trees purchased? What kind of rootstock was used? Was an interstock used? What variety of fruit? How soon did the tree begin to bear? What size did the tree reach? What has been its productivity? What

*Flower Grower, Sept., 1960, p. 31.

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has been the size and quality of fruit? What special problems have been encountered?

Gardeners in some cases will not know the kind of rootstock used or whether or not an interstock was involved. Please do not let this deter you from cooperating. Information is being gathered from various nurseries serving this area regarding methods used in producing dwarf trees they offer for sale. Thus, to know the nursery from which the trees were purchased will often enable us to determine the type of rootstock.

How might data be gathered? A form has been developed that can easily be filled out. It is suggested that all interested gardeners who have tried or are now trying the dwarfs phone or write to Denver Botanic Gardens and request a Report Form on Dwarf Fruit

Trees. Ask for as many as you have different varieties of fruit represented by your dwarfs. For example, if you have dwarf 'Lodi' and 'McIntosh' apples and a dwarf peach tree, ask for three forms. The telephone is EA 2-9656 or MA 3-1133, Ext. 428; the address is 909 York Street, Denver 6, Colorado.

Those who have recently planted dwarfs and are interested in cooperating in this study will be given an opportunity to report annually until the picture is reasonably clear as to the performance of the dwarfs under our conditions.

As evidence accumulates, reports will be made from time to time through *The Green Thumb* and other media. This study should be both interesting and, shall we say, fruitful.



Glow of Candlelight

BY PATRICIA MURPHY

BOOK REVIEW FOR THE GREEN THUMB

AS OUR MODE of living changes, gardens change. We may not realize it except by looking back. Who would have thought, even fifteen or twenty years ago, that beautiful gardens and orchid shows would be a major factor in your choice of eating places.

Patricia Murphy has proved it in her career and is telling about it in her attractive book, *Glow of Candlelight*.

Its very set-up is significant; the three sections of the book are My Life, My Flowers and Gardens, and Foods and Menus.

We might draw a parallel here with the changes that have taken place in garden magazines. The most successful ones have had to add eating and living to gardening. We might deduct from this that eating has become a major activity in today's garden or, preferably, that our gardens by this time have become much more than merely places to look at—rather outdoor living rooms for all



New York skyline is at Patricia Murphy's eyes as she steps out on the terrace of her penthouse, sky high, on Fifth Avenue, New York City. According to Miss Murphy's autobiography, *GLOW OF CANDLELIGHT* (Prentice-Hall), the plantings are changed with the seasons.

activities of life. Certainly the much greater importance that patios now fill, points in that direction.

How does one review *Glow of Candlelight* adequately? First of all, it reads well. We are carried from one restaurant to the next, as excited as Patricia evidently was about the success of each. We find out what made them desirable in the eyes of the customers, be the customers simple Brooklynites in her first venture, an abandoned eating place near her rooming house, or sophisticated millionaire yachtsmen and famous baseball players who come to the Bahia Mar Candlelight in Florida, incidentally enjoying the tropical garden there.

In addition, the book is frankly Pat Murphy herself. We meet her on the dust-jacket, a charming hostess; we follow her life from the Newfoundland village of fishermen to Brooklyn, New York (Sky High on Fifth Avenue), to Westchester, near Yonkers, to Kinsale just north of Palm Beach, Florida, and Bahia Mar. We get to know her mother Nana and her husband "Rosie," Captain Kiernan.

Coming to the garden part of "Candlelight," we are introduced to the garden fifteen floors up on the New York penthouse, the twelve months-a-year spectacular blooms in Florida, the \$169,000 put into landscaping the first winter in Westchester, the \$74,900 gardens at Bahia Mar, the collection of 90,000 orchids, and the annual renewal of 50,000 tulips, not to mention the thousands of poinsettias, roses, and chrysanthemums used in the gardens.

What is uniquely amazing is the fact that both tropical and temperate-zone



The tropical garden at Bahia Mar (Patricia Murphy's Candlelight at Fort Lauderdale) is a breathtaking experience. Adults and children find the fruit of the sausage tree amusing.

flowers decorate these restaurant gardens, being flown in mostly from one place to the other. This has made possible a flower display all during the year.

The book describes in detail the Sky High terraces in New York, the forty-eight acre estate of Kinsale at Port Sewall, the Westchester Candlelight gardens with their lake and moonbridge, thousands of tulips and daffodils, and hundreds of roses, and the popular gardens at Bahia Mar, Fort Lauderdale. It devotes a chapter to the orchid collections at Westchester and Kinsale.

In 1958 Patricia Murphy won an International Flower Show Trophy and a Horticultural Society of New York Gold Medal with her completely enclosed walk-in garden of tropical plants shaded by giant trees. How far we have come from the time when great private estates had practically the only landscaped gardens!

Read this amazing success story in which flowers play a big part.

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Epilobium angustifolium—narrow-
leaved fireweed

Epilobium latifolium—broadleaved
red willowweed

Helianthus angustifolius—narrow-
leaved sunflower, quite common
here

Rubus parviflorus—small-flowered
salmonberry

Ulmus parvifolia—small-leaved
Chinese elm

Senecio filifolius—threadlike leaves

Bergenia cordifolia—heartshaped
leaves, old name was *Saxifraga*
cordifolia, a plant for rock gardens
with a beautiful purple flower

Viola renifolia—kidney-shaped leaves
on a native violet

Campanula rotundifolia—round-
leaved harebell

Phlox multiflora—many-flowered
rockhill phlox

Solanum triflorum—three-flowered
wild tomato

Spiraea prunifolia—plumleaved spirea

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know in Latin? See the next
issue!

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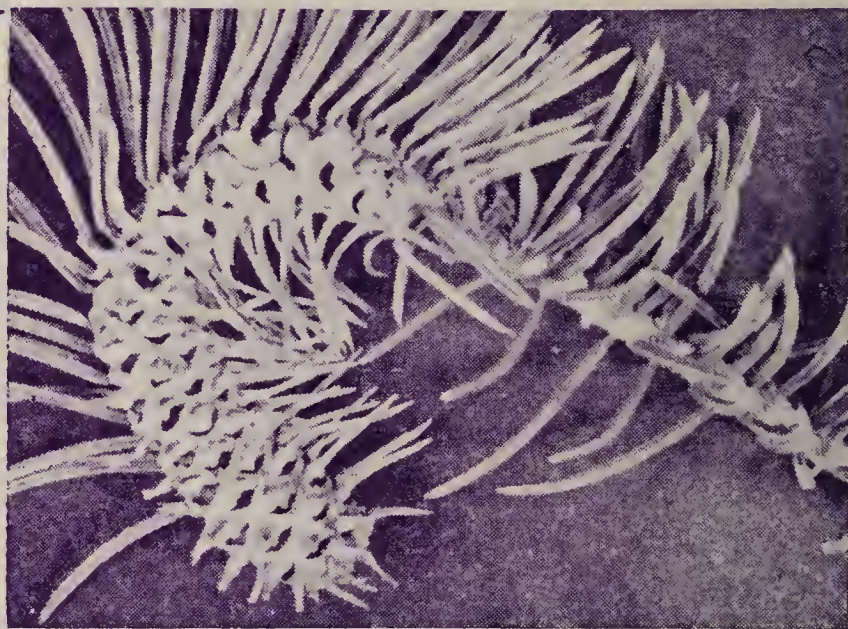
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The Green Thumb

Magazine for Rocky Mountain Gardeners

APRIL 1962

25 CENTS



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(Photo courtesy of The Bulb Growers of Holland)

• • • • •

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m.

KLZ Radio. The Green Thumb
Program by Herbert Gundell,
Denver County Agent

Every Saturday Afternoon — 4:30 p.m.

KLZ-TV, Channel 7. The Weekend
Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE

APRIL

2nd — Mon., 9:30 a.m., Denver Botanic
Gardens Junior Committee

3rd — Tues., 12:30 p.m., Mountain
View Garden Club

4th — Wed., 7:30 p.m., Botany Club

5th — Thurs., 7:45 p.m., Orchid Society

9th — Mon., 10:00 a.m., Judges' Council

10th — Tues., 10:00 a.m., Herbarium
Study Group

11th — Wed., 7:30 p.m., Landscape
Contractors

12th — Thurs., 8:00 p.m., Rose Society

14th — Sat. and Sun., 12:00 noon to

and 5:00 p.m. "Violet Time in The

15th Rockies." African Violet Display

18th — Wed., 9:30 a.m., "Fun with
Flowers" Workshop

19th — Thurs., 10:00 a.m., "Around the
Seasons" Meeting

20th — Fri., 2:00 p.m., Green Thumb
Editorial Board Meeting

22nd — Sun., 2:00 p.m., Colorado
Cactophiles

23rd — Mon., Tues., and Wed., Colorado

24th Federation of Garden Clubs
and Flower Show School.

25th Mrs. Seastone, 761-0491

25th — Wed., 7:30 p.m., Landscape
Contractors

MAY

2nd — Wed., 7:30 p.m., Botany Club

3rd — Thurs., 7:45 p.m., Orchid Society

4th — Fri., 1:00 p.m., Civic Garden Club
Presidents' Tea. Board meeting
12:00 noon

NOTES AND NOTICES

"VIOLET TIME IN THE ROCKIES" — April 14 and 15, Saturday and Sunday, from 12:00 noon to 5:00 p.m. Public invited. This is a display of African violets sponsored by the Rocky Mountain Area African Violet Council. Display to be held at Botanic Gardens House.

FLOWER SHOW SCHOOL — The dates have been set for Monday, Tuesday, and Wednesday, April 23, 24, and 25.

LANDSCAPE DESIGN SCHOOL — Monday, Tuesday, and Wednesday, May 21, 22, and 23, at Botanic Gardens House. Call Mrs. Glenn, HA. 4-1190, for information.

PLANT AUCTION AND SALE — Friday and Saturday, May 25 and 26, at the Mall in Cherry Creek Shopping Center. Consult article in this issue for details.

GARDEN TOUR — Date has been set for Wednesday, June 27. There will be more information in the next issue of *The Green Thumb*.

THANK YOU — To the many members who responded to our request and sent us the names of friends who might be interested in becoming members of Denver Botanic Gardens. Your response has been most gratifying.

CHANGE OF ADDRESS — Please notify us as soon as possible when you change your address. It costs us 12½¢ every time *The Green Thumb* is returned and re-mailed to your new address.

NOTICE TO GARDENERS — When you divide your perennials this spring don't put the surplus plants in the trash can or on the compost pile. Label them and bring them to Botanic Gardens House. They will bring money for the Denver Botanic Gardens at the annual Plant Auction and Sale, May 25 and 26. Meanwhile we'll take care of the plants.

Roses

which do well
in Colorado

CLYDE E. LEARNED

A REVIEW OF THE new rose catalogs indicates that between two and three hundred cultivated varieties of roses are normally handled by the nurseries and seed stores. Discussions with our Rose Society members and prospective rose growers indicate that there are numerous preferences as to the type of rose to be grown and the color desired.

In an attempt to meet the requirements of the various groups, a number of selections of the several kinds grown and that do well and are popular in this region are furnished. These selections are based on the experiences of the members of the Denver and American Rose Societies and the results obtained in our own Denver Botanic Gardens at City Park and 909 York St. as well as my observations in my own and many private gardens. It will be noted that many of the roses selected are those that have stood the test of time and are still top favorites.

The hybrid teas that are popular and do well in most gardens include the following:

1. Peaceyellow blend
2. Crimson Glorydark red
3. Charlotte Armstronglight red
4. Chrysler Imperialdark red
5. Tiffanypink blend
6. Helen Traubelpink blend
7. Rubaiyatlight red
8. Confidencepink blend
9. Mme. Henri Guillotred blend
10. Eclipsemedium yellow

11. Nocturnedark red
12. Garden Partyyellow blend,
nearly white
13. Show Girlmedium pink
14. Sutters Goldyellow blend
15. Tally Holight red
16. First Lovelight pink
17. Mojaveorange blend
18. Mirandydark red
19. Duetorange salmon and pink
20. Mission Bellspink blend

It is suggested that the best bargains in the above tabulation are Peace, Crimson Glory, Charlotte Armstrong, Eclipse, and Mme. Henri Guillot, since the patents have expired on these five bushes.

During recent years the grandifloras, which are a cross between the hybrid teas and floribundas, have performed very well in this region. In general these roses are a little taller than the hybrid teas and although some varieties in this group do have a tendency to

Rose
'Garden Party'

(Photo
courtesy of
Armstrong
Nurseries)





Rose
'Ruby
Lips'

(Photo
courtesy of
Armstrong
Nurseries)

cluster, they, for the most part, have individual stems which are long enough for cutting and are excellent for exhibition purposes.

Grandifloras that have done well and are recommended include these:

1. Queen Elizabethmedium pink
2. Carrouseldark red
3. Montezuma.....light red and orange
4. Starfirecurrant red
5. Roundelaydark red
6. Golden Girlmedium yellow
7. El Capitanmedium red
8. June Bridewhite
9. Gov. Rosellinimedium red
10. Pink Parfaittwo-tone pink

The floribunda roses which are recommended and are used very effectively in borders or hedges or where a mass planting is desired include the following:

1. Spartanmedium red
2. Frenshamdark red
3. Voguepink to red blend
4. Ivory Fashionwhite
5. Fire Kingmedium red
6. Fashionpink blend
7. Eutindark red
8. Dagmar Spathwhite
9. Floradoramedium red
10. Ruby Lipsmedium red
11. Little Darling.....yellow blend
12. Ma Perkinspink blend
13. Jiminy Cricketorange blend
14. Masqueradered blend
15. Circusyellow blend
16. Red Pinocchiodark red

17. Independencemedium red
18. Betty Prior..medium pink (5 petals)
19. Else Poulsenmedium pink
20. Goldilocksmedium yellow

The American Rose Society Guide for buying roses lists Texan as a floribunda. This rose seems to have the characteristics of a grandiflora and is recommended very highly as a rose that will do well in the vicinity of Denver and one you will want in your garden.

Although many new climbing roses have been introduced in recent years, most of them do not seem to have the hardiness to withstand our tough Colorado winters.

The three most popular climbers for this area appear to be these:

1. Improved Blazemedium red
2. New Dawnlight pink
3. Paul Scarletmedium red

The first two are everblooming and normally bloom three times each season, whereas the Paul Scarlet is limited to one burst of blooms in the early summer.

Other climbers that give promise of being able to withstand a moderate Colorado winter include Spartan, an orange red; Don Juan, a dark red pillar; Gladiator, a medium red; Doubloon, a medium yellow; and High Noon, a dark yellow.

The yellow climber, Golden Showers, which was an All-America Selection in 1957, is not too satisfactory. It actually is a pillar rose and tends to freeze back each winter, but it seems to have enough energy to produce a new crop of blooms each season.

During recent years many new and beautiful roses have been introduced, and it is quite probable that some of these new roses should be included in the prior tabulations. However, I have purposely held off including them until they have proved thoroughly satis-

factory for this region. In conclusion, my advice to the novice rose growers would be to stick for the first year or two with the older recommended varieties and have fewer disappointments.

For those persons who must have the new creations, the following are mentioned.

Here are the four All-America Rose Selections for 1962:

CHRISTIAN DIOR — Hybrid Tea. This fast-growing bush has medium red blooms. To date it is considered only a fair rose for this area.

GOLDEN SLIPPERS — Floribunda. This rose appears to be a rather sparse bloomer with red and golden colored blooms. The brilliant light orange buds are very attractive, but the full-blown rose fades and is nothing to get excited about.

JOHN S. ARMSTRONG — Grandiflora. This bush appears to be rather small for a grandiflora. The blooms are dark red and double. They open up rather flat without showing the center.

KINGS RANSOM — Hybrid Tea. This rose has long pointed buds which open into beautiful golden yellow blooms. Although the bush is rather small, it looks like a must for those who like yellow roses.

A few other roses which are well advertised and may or may not have what it takes to be favorites are the following:

SOUTH SEAS — Hybrid Tea. This

rose has coral pink blooms and, if you can believe the catalog pictures and description, is a knockout. The bush has attractive red stems, appears to be disease resistant, and had fairly good growth the first year.

SAN FRANCISCO — Hybrid Tea. The bloom coloring on this rose is rather unusual; the under surface of the petals is a cardinal red and the upper surface, signal red.

PERSONALITY — Hybrid Tea. This compact growing bush, with blooms of a golden yellow with splashes of red-pink on the petal tips, according to one rose authority, will be more beautiful than Peace. Its parents are Peace and Sutters Gold.

HAWAII — Hybrid Tea. This orange blend rose has an outstanding color but, other than that, did not show up very favorably in the gardens where grown.

MIRACLE — Floribunda. This rose is said to be similar to Spartan in coloring and holds up well in the sun. The buds are a miniature of hybrid tea buds; some are borne singly, whereas others are in clusters.

AMERICANA — Hybrid Tea. This heavily advertised rose has dark red, velvety, medium-sized blooms and the bush has a tendency to be on the small size.

CONRAD HILTON — Floribunda. This yellow floribunda is said to be disease resistant and is described as the yellow floribunda we have been waiting for.

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Our Most Dependable Shrubs

DR. A. C. HILDRETH

SHRUBS ARE THE most versatile plant materials used in landscaping. In their natural distribution they range from the seashore to high mountain tops and from the hottest deserts to the arctic region. Their wide adaptation makes it possible for us to select shrubs for almost any condition — extreme heat or cold, sun or shade, dry banks, wet places, exposed sites, and acid, alkaline, or saline soil.

Their great variation in size and shape, from upright types of almost tree-height to creeping forms, enables us to employ shrubby species for many different purposes. Among these are single specimen, small group, or large mass plantings; tall, medium, or low shrub borders; formal shrub-beds; hedges and screens; ground covers; and shrubs in planters, pots, and tubs for both outdoor and indoor decoration.

Observations on old Denver plantings of about a half century ago indicate that the number of kinds of shrubs in common use at that time was very limited. Predominating were spireas, lilacs, and honeysuckles. Usually only one species of each was used, specifically, Vanhoutte spirea, common lilac, and tatarian honeysuckle. Sometimes there was also a sprinkling of mock orange, privet, snowball viburnum, and forsythia.

During the 1920's evergreen coniferous shrubs gradually came into general use in this region and to the ubiquitous "big three" of deciduous shrubs were added three evergreens,

mugo pine, Pfitzer juniper, and tamarix juniper.

A generation ago the catalog of a prominent Colorado nurseryman listed only 29 shrub species plus a few named varieties of roses. In 1957, George W. Kelly, in his book, *Good Gardens in the Sunshine States*, described 160 species and subspecies of shrubs useful to Colorado gardeners. It would be possible to add to his list 50 or perhaps even 100 other species and subspecies of shrubs that are adapted and worth growing in this region.

Yet our present-day plantings involve only a very small percentage of the shrubs that can be grown, and there is still a rather slavish adherence to the traditional "six" of the past generation. But there have been improvements. French hybrids and villosa hybrids have replaced the common lilac; blue-leaf and Carlton honeysuckle have been substituted largely for the pink tatarian; and to the familiar Pfitzer, other forms of the parent Chinese juniper have been added.

Of course no one wants to use 260 kinds of shrubs in landscaping his home grounds. Yet every gardener likes a little variety in his planting and he also wants something different from what he sees in his neighbors' gardens.

To gardeners, who are bewildered by the many shrubby species which are adapted to our area, the following list is offered. These shrubs have been selected because they are thoroughly adapted to our conditions, are easily

grown, and are usually available in the nursery trade. They provide a wide range of forms and textures. Many have attractive flowers, fruits, or other ornamental features at certain times of the year. Of course, other lists of satisfactory shrubs could be prepared which might include none of those here mentioned.

TALL SHRUBS

Japanese lilac, *Syringa amurensis japonica*, is the tallest of the lilacs and the latest to bloom. The creamy white flowers are borne in immense clusters.

Late lilac, *Syringa villosa*, blooms long after the usual lilac varieties have faded. Several hybrids of *S. villosa* developed by Canadian breeders are also late blooming and much superior to the species type. Among the better ones of these are Isabella (pink), Donald Wyman (deep rose), and Pocahontas (deep purple).

Common lilac, *Syringa vulgaris*, is not recommended. Instead, plant its hybrids, usually called French hybrids. Named hybrid varieties differ considerably in flower form, color, and fragrance; they should be selected according to personal taste. Popular cultivars are Ludwig Spathe (deep purple), Lucie Baltet (pink), Congo (red), and Mme. Lemoine (white).

Rocky Mountain birch, *Betula fontinalis*, is a compact shrub or small tree with glossy, brown bark.

Wayfaring tree, *Viburnum tomentosum*, has velvety, dark green foliage which changes to red in autumn. It has showy white flowers in spring and attractive fruit clusters in autumn.

Staghorn sumac, *Rhus typhina*, with its frond-like leaves gives a tropical effect. The red autumn color or the foliage and the red fruit clusters which persist all winter add to its ornamental value. The cut-leaf variety, *R. typhina laciniata*, is more decorative than the

typical form but is lower and more spreading. This sumac has the fault of sending up suckers from the roots.

Blue-leaf honeysuckle, *Lonicera korolkowi*, has blue-green foliage and large pink flowers, followed by bright red berries.

Shrub althea, *Hibiscus syriacus*, is a summer-blooming shrub with white, pink, red, or purplish flowers, either single or double, resembling hollyhocks. This shrub is not altogether winter-hardy in our climate but it survives. Established bushes will weather most winters without injury. It should be planted in a sheltered location. The double-flowered forms are rumored to be hardier than the single ones.

Common buckthorn, *Rhamnus cathartica*, is one of the hardiest and most drought-tolerant shrubs. It is excellent for screens or barrier hedges, either informal or clipped.

Kashgar tamarisk, *Tamarix hispida*, has feathery blue-green foliage and terminal plumes of pink flowers in summer. It is drought resistant and tolerant of saline soil.

Buffaloberry, *Shepherdia argentea*, has silvery foliage and red or yellow berries which ripen in late fall. It is valuable for its silver note in the shrub border and for its tolerance of saline soils. The fruits make excellent jelly.

Newport plum, *Prunus americana* x *P. ceracifera pissardi*, is a hybrid plum which is hardy and drought tolerant. The foliage is dark red; the red fruits are also decorative. These shrubs make good accent points in the landscape.

MEDIUM-HEIGHT SHRUBS

Dwarf winged spindle tree, *Euonymus alatus compactus*, is a neat shrub with brilliant red autumn foliage.

Oregon grape, *Mahonia aquifolium*, is the best of the evergreen shrubs which we can grow in our climate. The foliage resembles that of holly and

the blue berries are borne in clusters somewhat like grapes, hence the name. They are used for jelly-making.

Vanhoutte spirea, *Spiraea vanhouttei*, is the most popular white-flowered shrub. It blooms in early spring. The arching branches covered with garlands of white flowers give the bush a fountain-like appearance.

Japanese barberry, *Berberis thunbergi*, is a neat, thorny shrub with attractive red berries in fall and winter. This is a good hedge plant. The variety *B. thunbergi atropurpurea* has red foliage.

Peking cotoneaster, *Cotoneaster acutifolia*, is a neat shrub with glossy foliage and black berries that persist all winter. It is useful for hedges.

European cotoneaster, *Cotoneaster integerrima*, has silvery blue foliage and abundant red berries. This is an extremely hardy shrub.

Native dogwood, *Cornus stolonifera coloradensis*, is perhaps our most valuable native shrub. It bears white flowers and whitish fruits continuously throughout the growing season, and the foliage, green in summer, takes on a rich red color in autumn. The mature stems are red throughout the year.

Pfitzer juniper, *Juniperus chinensis pfitzeriana*, is a popular evergreen shrub, adopted to a wide range of conditions. It is easy to grow and is comparatively free from pests and diseases.

Savin juniper, *Juniperus sabina*, is a spreading evergreen shrub that has blue berries in fall and winter.

Bluebeard or blue spirea, *Caryopteris clandonensis*, bears bluish flowers in later summer. Cultivars Blue Mist, Heavenly Blue, and Azure are better than the typical form of this hybrid species.

SMALL SHRUBS

Lead plant, *Amorpha canescens*, is a summer-blooming plant with spikes of

purplish flowers and silvery blue foliage. It is extremely hardy and drought tolerant.

Cranberry rockspray, *Cotoneaster horizontalis*, is a dwarf cotoneaster with nearly evergreen foliage and large red berries resembling cranberries. This shrub is excellent for the rock garden.

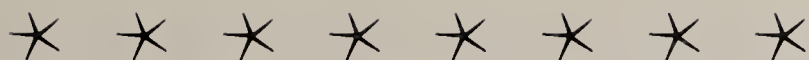
Potentilla fruticosa farreri is the best of the shrubby cinquefoils. The foliage is deep green throughout the growing season and contrasts pleasantly with the bright yellow flowers.

Creeping mahonia, *Mahonia repens*, is a low evergreen shrub native in our mountains that is becoming popular as a ground cover. The foliage and berries are similar to those of the taller mahonias.

Froebel spirea, *Spiraea bumalda froebeli*, is a summer-blooming shrub with a profusion of magenta flower heads. During severe winters the tops of this shrub freeze back considerably and it is best to cut the shoots back nearly to the ground each spring and allow the plants to develop new tops.

All these shrubs will thrive in any good garden soil and require no more care than usually given woody plants. Overwatering and excessive fertilizing should be avoided. Evergreens and all recently planted shrubs will benefit from occasional winter watering.

Unless grown as sheared hedges or in formal plantings, shrubs should be pruned so as to preserve their natural shape as nearly as possible. Pruning should consist mainly in thinning out stems and branches to prevent overcrowding and in cutting back wayward branches. The abominable habit of shearing all shrubs with a hedge shearer, now becoming prevalent in this region, destroys their natural beauty and is decidedly out of place in informal plantings.



OUR REWARDS *from* BOTANIC GARDENS

DR. MORAS L. SHUBERT

THIS TITLE SEEMS to summarize the general theme of the dynamic speaker at our Denver Botanic Gardens dinner on February 14. Mr. T. H. Everett, Assistant Director of the New York Botanical Garden, displayed such a spark of excitement and adventure in his pleasantly humorous talk that few could realize that they had listened for nearly an hour and a half. There is probably no other person who could have so masterfully kept an audience keyed up with enthusiasm on a subject that most people would expect to find dull. It is unfortunate that all of our Denver Botanic Gardens members could not have heard this great disciple, so that each one would be spurred into a crusade for greater support of our own botanical gardens.

Mr. Everett told a few of the too-little-known stories of how so many crops upon which we depend have

been developed by scientists working for botanic gardens throughout the world. As an example, he told the fascinating story of how employees of Kew Gardens set up the rubber plantations in the East Indies from seeds of the Para rubber tree, *Hevea brasiliensis*, which were literally smuggled out of their native home in South America. Since the seeds cannot be stored, they were allowed to germinate and grow on their way to England. Later the young seedling trees were transported, in Wardian cases, all the way to the East Indies under the watchful eyes of gardeners who went with them. Ever since that time nearly all of our natural rubber has come from the progeny of those trees.

Man has always been dependent upon plants for food and innumerable other items and will continue to be. He has only been able to keep up with

Mr. T. H. Everett,
Assistant Director,
New York Botanical
Garden

Mrs. Lawrence A. Long

Mr. Lawrence A. Long,
President, Board of
Trustees, Denver
Botanic Gardens, Inc.



increasing demands through the improvement of production, and many of these improvements have come from research and technology carried on at our botanic gardens. While there are many places where plant research goes on outside of botanic gardens, the botanic garden, Mr. Everett pointed out, is the only institution which concentrates its efforts and facilities exclusively in this line.

Our speaker told us that botanic gardens must serve three purposes:

1. They must disseminate knowl-

edge to all who seek it by all of the systems of communication available.

2. They must record and preserve knowledge through adequate libraries, labelled growing collections, and herbariums.

3. They must seek new knowledge by intensive research.

With the support of our membership and through the nurturing and growth of the fertile ideas planted by Mr. Everett, we can accomplish wonders that are beyond our present dreams with plants here in the Rocky Mountain environment.



THE NAME GAME

M. WALTER PESMAN

Do you like colors?

Populus alba — White poplar

Aquilegia coerulea — Blue columbine

Digitalis purpurea — Common purple foxglove

Helleborus niger — Christmas rose, with black roots

Geum coccineum — Orange-red flowers

Heuchera sanguinea — Coralbells, with blazing red flowers

Geranium sanguineum — Cranesbill, with red flowers and red fall leaves

Cornus sanguinea — Bloodtwig dogwood

Ribes aureum — Golden currant

Crataegus chrysocarpa — Gold-fruited hawthorn

Shepherdia argentea — Silver buffaloberry

Linum flavum — Yellow flax

P.S. What do botanists insist on calling kinnikinnick? Why?

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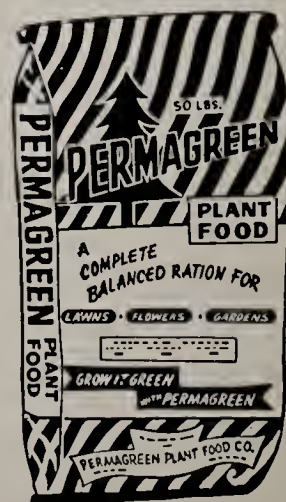
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The Koch Garden

RUTH REID KOCH

THE DRY, BROWN, and dusty-looking sweet autumn clematis, *Clematis paniculata*, on our old wire fence gives no indication of the visual delights that await anyone on the other side. Won't you be my guest and open my garden gate and walk with me around my garden to see it as it comes awake?

To the right of the flagstone walk are three small Centennial crabapple trees which at first show lovely, fat, deep-rose tips which will turn into glossy leaves and white blooms. (These trees are planted too close together, and I know that someday perhaps two will have to be removed; but I wanted to achieve privacy from the street and also desired to look into a sort of little "woodland" from our living room window.) In a wide ring around the center crabapple lie big double-nosed King Alfred daffodils which will bloom with their gorgeous yellow cups. Between three creeping Andorra and Bar Harbour junipers are clumps of Mt. Hood and Beersheba daffodils, both white in color. Clumps of primroses are showing their green and crinkled leaves along with bunches of violets. (The violets remind me of a line from Oliver W. Holmes, "When wake the violets, winter dies." But I'm afraid winter dies hard because these violets have been covered with a white blanket three times since they first came up.)

On the left of the walk, under a huge old American elm tree, are the bright red leaves of the native Colorado groundcover, *Mahonia repens*. It is similar to the Oregon grape, but is a creeping variety which grows over our Colorado foothills. There is also some periwinkle, *Vinca minor*, another groundcover. I keep poking under its leaves to see if any of my tiny bulbs are showing through the earth. I am especially eager to see these bulbs since I have not grown them before; they were the gift of a friend from Acton, Massachusetts. For such tiny bulbs, they have the longest and most important-sounding names! The yellow hoop petticoat, *Narcissus bulbocodium conspicuus*, has one-inch cones of golden yellow on four-inch stems which point the flowers heavenward. All they need is sandy, peaty soil with plenty of water in the spring when they are getting ready to bloom. *Tulipa sylvestris* is fragrant with slender, bright yellow flowers on fifteen-inch stems. A late bloomer, it should be left alone to colonize.

Bowles variety of myrtle covers the small, partially circular piece of ground under the Savin junipers under our living room window. Tucked in everywhere I could find space are appropriately named glory-of-the-snow, *Chionodoxa luciliae*. (These dainty star-shaped flowers bloom with a blue brilliance which is especially breath-taking when contrasted with the pure white of the snow. They should be planted, like most spring-flowering bulbs, in the autumn, setting the bulbs three inches deep. They benefit by a top dressing of manure in late fall and should multiply from year to year.) Siberian squill, *Scilla sibirica*, are also planted here; their deep blue flowers have endured several harsh storms to forge their way into my garden. *Iris danfordiae* blooms with three

bright yellow flowers on each stem. Planted nearby is *I. reticulata*, with its delicate perfume and dark purple falls with orange spots on the tips. The beautiful snowdrop, *Galanthus nivalis*, has been blooming since early January. Its small, white blossoms, suspended from delicate stems and looking like a series of bells, have withstood many heavy snows and biting winds. (They should be planted in groups in rich loam, including some leaf-mold, in early September; set them three inches deep.) Winter aconite, *Eranthis hyemalis*, adds its pale yellow, buttercup-type flower to this little garden. Yellow, purple, white, and striped crocuses made us happy with their bright blooms — but not for long! (We had just begun to enjoy their cheery colors when they disappeared. I suspected the belligerent and unwanted English sparrow, but, I must confess, the culprit was our much loved and well-fed house finch or linnet. I guess his diet of sunflower seeds which we supplied all winter lacked a certain something which he enjoyed in the crocuses! Rationalizing, I told myself that every bush I plant must have a berry for my birds — so why not plant the crocuses for them, too!)

I must digress for just a moment and speak of our birds, for without them our garden would never come alive; because of them it never dies. The small and energetic bundle of beige and black feathers that is called a black-capped chickadee or the mountain chickadee is our constant visitor and companion, either at the big piece of suet encased in chicken wire and hung in the hawthorn tree by our study window or clinging to the small, red container hanging from the terrace roof and holding the sunflower seeds he loves. An exciting newcomer this winter was Cassin's purple finch with a topknot of gleaming, almost metallic-looking, rosy-red feathers and a pinkish tinge to his plain gray breast. The house finch also patronizes our feeders and suet bar. Now with spring here, he heralds the event every morning beside our bedroom window with his cheerful song. The cocky robin has made his appearance which, somehow, seems to make spring really official. And we have heard the raucous voice of the Eastern blue jay but have not yet seen his beautiful blue and gray presence. On quiet and sunny days I turn on the motor which pumps water into our five bird baths. The sound of the water falling from one level to the other soon attracts many of the migrating birds, and our garden is alive with song and flashing wings of the yellow warbler, American redstart, white-crowned sparrow, chipping sparrow, Audubon's warbler, and about forty more birds that we have observed. These five bird baths are the landscape architect's answer to our request for falling water and a place for birds to bathe. This was developed as the focal feature; it is our garden sculpture. (See picture of bird baths, p. 90.)

Under the shade of my neighbor's towering blue spruces (What a wonderful bird-haven they are.), I am experimenting with a wildflower garden. (I purchased a soil-testing kit and then proceeded to add cottonseed meal and German or Canadian peat moss to make the soil more acid. I think it still should have more humus, so I will continue to add leaf-mold and peat.) The glossy leaves of *Galax aphylla* are a beautiful bronze. A lovely groundcover which stayed green all winter is partridge berry, *Mitchella repens*, which has a white or pinkish, fragrant flower in the spring and bright red berries in the fall. The pink ladyslipper, *Cypripedium acaule*, and common yellow ladyslipper, *C. pubescens*, will soon be blooming between the big clumps of the vase ferns. The snow trillium, *Trillium grandiflorum*, has a large white flower turning to rose color. Jack-in-the-pulpit,

Arisaema triphyllum, is sending its thick, dark, reddish-green leaves up. I still have a lot to learn about this part of my garden, and I want to try many more wildflowers, especially our native ones.

Another feature in the garden design are the raised flagstone planter boxes by the terrace and the garage. In these the following tulips are blooming: *Dasy-stemon*, with a dwarf flower of creamy white with deep yellow center; *T. fosteriana* 'Red Emperor' with its enormous flower of vivid scarlet with black inside base; and *T. fosteriana* 'Zombie' with the outside deep rose and edged apricot-pink. In a large rectangular bed surrounded by bricks set in sand are a hundred or more of the May-flowering breeder tulips, cottage tulips, lily-flowering tulips, and Darwin tulips. One of my favorite double narcissuses is Cheerfulness, with its charming cluster of double white florets with primrose centers. It is planted in the box by the garage along with Queen of the Bi-Colors daffodils and Mt. Hood daffodils.

Spring is bursting out all over in my garden. From a distance the trees and shrubs still look dormant, but closer examination reveals the tiny buds are packed with life and just waiting for a really warm day to pop out into leaf. And one day, as if by magic, the whole garden will have a soft green covering that is indescribably beautiful. The pale pink of the Manchu cherry will blend with the yellow of the forsythia and I will recall this little verse which I love:

*"The kiss of the sun for pardon,
The song of the birds for mirth —
One is nearer God's heart in a garden
Than anywhere else on earth."*

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Pete Ponders

Dear Pete,

Every spring I see a rosy-purple haze carpeting the greens of the Park Hill golf course. Is it a mirage?

ROSIE GREEN

Dear Rosie,

No mirage. It's *Chorispora tenella*, a high-classed term for an annual weed of the mustard family. According to my favorite doctor, Helen Zeiner, this

purple haze has become increasingly apparent each spring for the past 10 to 15 years. A native of Asia, *Chorispora* is established in various places throughout the United States and is spreading rapidly over Colorado. Doctor Helen notes the weed is very noticeable in large areas such as you describe, especially on some cloverleafs along the Valley Highway.

Which brings another point to pon-

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der — is it cloverleafs, cloverleaves, or clover leaflets?

Dear Happy Ponderer,

Although delighted to be in our new home, like others in modern suburbia we face the sad plight of unlimited projects and limited funds. We lack time and money to properly prepare the soil for our velvety lawn. Yet I cringe at facing a summer of tracked-in mud and dust. Can you help?

PLIGHTED ONE

Dear One,

A temporary lawn was our solution to a similar plight. It gave us time to get our feet on the ground without miring in mud.

If you can afford to have some peat and manure rototilled, you'll have an excellent beginning. Otherwise, bring the area to rough grade and water thoroughly or wait for a good rain. A few days later scratch the soil surface and sow annual rye, 3 lbs. to 1,000 square feet. Keep the surface moist. The seed will germinate in three to five days, produce a coarse green lawn, and be relatively inexpensive. Mow periodically, without catching the clippings, to prevent seed formation and to provide additional mulch.

Before the ground freezes in autumn add rough rotted cow manure, rip the area 14 to 18 inches deep, and plow. In spring rototill and proceed to plant your permanent lawn as described by George Kelly in the current series of lawn articles.

Besides postponing the expense of proper soil preparation (Such preparation is essential if you want a good turf.) you'll have controlled the dust and tracking problem and improved the tilth of your soil immeasurably. This is not a new method; the British have used an intensified green manure program for centuries.



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Water Display

JULIA



On this hilltop site in Colorado it is 400 feet straight down for water. This naturalistic pool and spring is possible with a recirculating pump just as it is in a city garden. Bringing water to the hilltop has brought many wild visitors. The owners were delighted to awake one morning and find 3 deer, which have since become frequent visitors.



Water in the garden need not be an end in itself. The primary purpose of water in this garden is to attract birds. To get the maximum sound for the birds to hear and the maximum area for their bathing this garden sculpture was designed. The water rises in the tallest basin and falls to each of the others. In winter it becomes a feeding station.



This family had a small figure piped small formal garden. A very little way a long way here. This small figure Denver's superb parks. The small figure arid climate where water is a precious this birdbath full does not seem extra



On a large property the water feature may serve purpose of utility as well as visual satisfaction. The swimming pool was designed to be a feature of formal entertaining area as well as to provide recreation for the family. The gracefulness of the oval pool is not marred by a gross structure for the diving board. This solution was made possible by the sloped lot.

in the Garden

ANDREWS

garden is an unnatural thing. Few of us
water — such as rivers or creeks, lakes or
and the psychological effect of coolness
our man-made environments, our city
areas.

into our environment? The manufacture
oon" to this problem. Now even on a
te amount of fresh water for a fountain
photographs from the office of Ries and
water has been brought into the man-



The sound of running water adds charm to this terrace of a town house. The walls screen an unpleasant alley view from sight. The bottom of the pool is painted a very dark color; it will reflect the trailing vines and colorful begonias when the fountain is turned off.



This wall fountain is the focal point for a garden room. In summer the sound of the water is pleasant and inviting through the open windows. In winter the strong pattern and the evergreen vine are still pleasant and interesting even with the dry basin.



a fountain in the center of their
just enough to fill the basin, goes
w in scale with its setting, one of
ould be lost without the wall. In an
modity the tiny amount used to keep

In public areas water in the landscape benefits many people and enhances the architecture. In a state where the main business is tourists, it behooves us to impress them with our attractive cities so that they will return.



SCOOPS BY SCOTT

MRS. JOHN SCOTT

AFRICAN VIOLETS lead the houseplant parade! Those who don't have them soon will, because they propagate so easily owners either give them away or become space bound.

As with any other plant, there are bound to be differing cultural practices. Mrs. William H. Campbell, president of the Rocky Mountain African Violet Council, doesn't agree with the experts who write books on potting procedures. Several authors advocate over-potting, using a pot two sizes larger than the plant requires, rather than the customary one-size larger pot. These same writers think African violets can bloom well without being a little pot-bound, an aid to most other flowering plants.

Mrs. Campbell, who wrote an informative article on African violets for the June, 1953, issue of *The Green Thumb*, reminds us that these popular posies aren't violets at all. They came from Africa, and their generic name is *Saintpaulia*, after their discoverer, Baron Walter von Saint Paul. They are members of the Gesneria family, and thus related to *Achimenes*, *Episcia*, *Isoloma*, *Streptocarpus*, and *Gloxinia*.

All houseplants should conform to our living conditions, not vice versa. That's where the African violet excels. It can take our ordinary house temperatures so long as the night temperature doesn't drop below 60 degrees. And it can do without sun; all it asks for is plenty of light.

Fertilizer-wise, it's a light feeder;

about one-half the strength or amount of fertilizer usually recommended on the package or bottle is sufficient.

The African violet goes full force all year, with nary a dormancy period as such, according to its enthusiasts. If occasionally a plant does succumb to some disease, do what all good indoor-gardeners do: take it, pot and all, to the nearest trash barrel and dispose of it.

Good plants, properly cared for and washed regularly (There are many ways to bathe African violets.), will not be bothered by insects, with the exception of the cyclamen mite which causes the leaves to curl and twist and to become overly hairy and the plant to fail to bloom. Garbage the pot, plant, and mite!

The African Violet Society of America, Inc., had 15,000 members in 1960, of which the Rocky Mountain region has its share. Mrs. Floyd Hammon, 1087 S. Madison St., Denver, will be glad to give information or accept memberships. Or contact these club presidents: Mrs. J. H. Knowles, The African Violet Society of Denver; Mrs. Al Guthner, The Friendly African Violet Society; Mrs. Floyd Hammond, Rainbow African Violet Society; Mrs. Robert Seeber, Mile Hi African Violet Club.

If you live out of this area write to Myrtle Radthe, Treasurer, The African Violet Society of America, Inc., P. O. Box 1326, Knoxville, Tennessee. Individual memberships are \$4.00; com-

mercial \$13.33; research, \$20.00; sustaining, \$10.00; and life, \$66.66.

The object of the Rocky Mountain African Violet Council, says Mrs. Campbell, is “. . . for participating clubs and individuals to work in harmony and cooperation to stimulate widespread interest in propagation and culture of African violets.”

And they're doing just that by having a display at the Denver Botanic Gardens, 909 York St., on April 14 and 15. This display is open to the public from 12 noon to 5 p.m. Their theme is “Violet Time in the Rockies.” Mrs. Glen Clayton is chairman and Mrs. R. B. Vance is co-chairman.

While this display or exhibit is not being formally judged this year, it probably will be in the future. And as you view these beauties, keep in mind how they are rated in a competitive show —

Scale of points for judging specimen plants:

Leaf Pattern or Form (symmetry of plant), 30; Floriferousness (quantity of bloom according to variety), 25; Condition (cultural perfection — freedom from diseases, insects, and marred foliage), 20; Size of bloom (according to variety), 15; and Color (according to variety), 10.



African Violet

Scale of points for judging arrangements:

(African violet blossoms must predominate.) Color Combination, 20; Design, 25; Proportion and Balance, 10; Relation to container, 10; Distinction and Originality, 15.

Scale of points for judging naturalistic or woodland scenes, terrariums, dish gardens, etc.:

Suitability of material, 25; Proportion, 15; Condition, 15; Design and Arrangements of planting, 35; Color Combinations, 10.

Colorado judges are John S. Coryell, Arvada, and Mrs. Howard E. Evans and Mrs. George Rutt, both of Fort Collins.

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LOOKING AHEAD to the City of the Future

CHARLES W. KEES

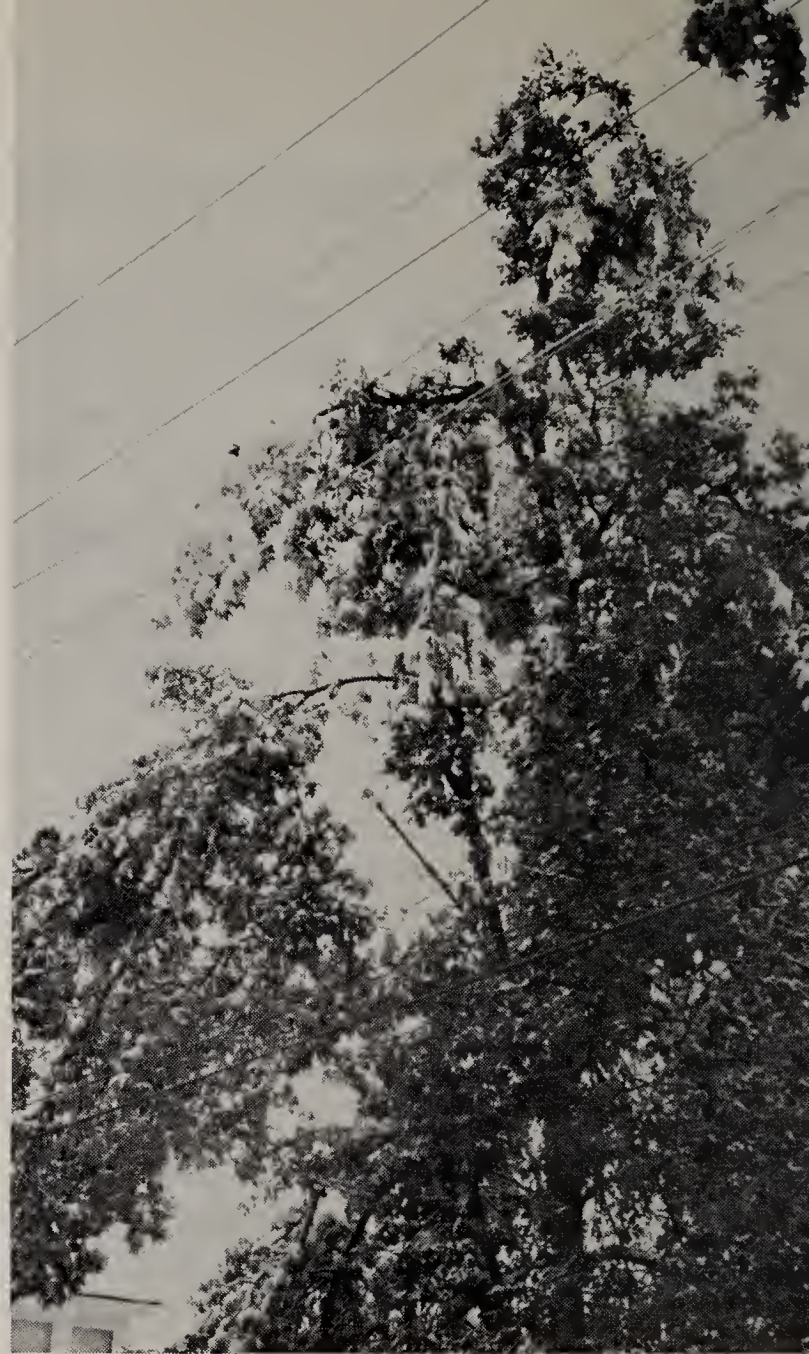
Working Office Supervisor

Electrical Distribution Division

Public Service Company of Colorado, Denver

IN THE PAST 75 years electric energy has grown from a laboratory curiosity to one of the most dominant forces in the world. Under present conditions, both urban and rural, we could hardly exist without a continuous, adequate flow of electric current. Some are still inclined to think of electricity in terms of light, but in the modern home it performs a multitude of tasks — cooking, washing, drying, heating, freezing, cooling, cleaning, and entertaining. Cities and industries are lighted and powered; the flow of commerce and the magic of modern communications are all predicated on an unfailing source of electric energy.

Today everyone requires the vital services rendered by both trees and conductors of electricity; therefore, most homeowners have a personal interest in each. It appears that it is a mutual responsibility to initiate and maintain a thoroughly intelligent program to harmonize trees and overhead electric lines so that a reasonable min-



Pre-seasonal Storm Damage

(Photo courtesy of Public Service Co. of Colorado)

imum of interference with the services of each will result.

First, of course, we must be concerned with the protection of the enormous number of street trees which we have now, in spite of the multiple troubles besetting them; and we are using all devices possible in construction, etc., to preserve them. The use, generally speaking, of trees that grow to huge proportions was undoubtedly justified in the days of horse and buggy and in some locations today; but with the changing times, for a multitude of reasons, the trend appears toward smaller trees.

In the past the pioneers overcame the prairies. In later years through need, and suitable to the times, thousands of our present large and beautiful trees were planted. (This occurred in our own city from 1906 to 1912.)

Now in contrast with needs involving present-day conditions, it seems necessary to consider location and space limitations very seriously. Where space permits and where shade is required, the traditional huge shade tree could still be the best choice when they are a respectable distance from overhead utility lines and add to the varying contrast of landscaping; but contrary to this, havoc can result, and the chance of disrupted electrical service increases proportionately with the size of adjacent trees. Storms usually destroy the oldest and largest trees in their paths and the trees crash down, tearing wires and poles as they fall. This was exemplified during hurricanes in the East and during pre-seasonal storms in our own community. From the standpoint of the power company, clearance from trees is essential for continuity of service and is maintained at a staggering cost. Trees properly located avoids trimming and the loss of beauty and symmetry of the trees. Today, increased load factors demand increased distribution voltages requiring adequate tree clearance. Awkward pole heights with the present trend of rambling low architecture are not desirable.

The most hopeful of the ultimate solutions to the tree-wire problem can be the selection of trees of a suitable character to fit the space or height limitations. Proper street trees are closely allied with adequate street lighting; such lighting is powered by wires that interfere with trees. Their volume is greatly impaired, also, unless



Poorly Located Tree

(Photo courtesy of Public Service Co. of Colorado)

trees allow the light rays to shine on streets and sidewalks with a minimum of interference. The lighting of streets and highways is an exact science and is closely inter-related to traffic and pedestrian accidents, crime, delinquency, and property values. City foresters, landscape architects, arborists, utilities,

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Crowded Growing Conditions
(Photo courtesy of Public Service Co. of Colorado)

and public officials are extending a sincere policy of mutual helpfulness toward a long-range solution relative to the co-relation of trees and wires in the interest of the general public.

Population and industrial growth must be projected years into the future; therefore, we feel we would be remiss if we did not contribute a thought to this subject, in view of our vast new

subdivisions and home building projects and the importance of the proper tree planted with due respect for overhead lines. We are most interested in the attractiveness of our cities and communities to which trees add a great part, and it is to this end that such action will contribute now, and for years to come, to our constant efforts to maintain and improve our service.

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The Black Hills Beetle

THOMAS B. BORDEN

State Forester, Colorado State Forest Service

"WHAT'S the story on the Black Hills beetle, anyway?" This is a question you have heard or have asked yourself after reading the publicity in the *Evergreen Canyon Courier*, *Boulder Camera*, the *Denver Post*, or the *Rocky Mountain News*.

Are our ponderosa pines in danger? Is it worth the "chips" to control the beetle? The forests all belong to the U. S. Forest Service, the Bureau of Land Management, or the National Parks Service, so why is state money being spent to combat the beetle?

First, let's discover something together. There are approximately 21 million acres of forested land in Colorado. About 14 million are owned by the Federal Government. Who owns the remaining 7 million acres? That's right, private citizens and local and state governments. As an example, in Jefferson County about half of all the timber land is privately owned.

For the past 20 to 30 years, many people residing along the front range have tried to control the Black Hills beetle. Unfortunately, the scattered, intermingled ownerships defeated the efforts. Imagine that you own an acreage of ponderosa pine. You are surrounded by other tracts with other owners who may not care or may not have the funds to control the beetle on their lands. Why should you treat your trees at a cost of \$5.00 each when just across the property line nothing is being done? You might try, but it's just like trying to get out of a snow drift — you just spin your wheels.

In 1955, the State Legislature passed a law stating that the Board of Agriculture (the administering body of the Colorado State Forest Service), is charged with the "protection of the forest lands of the state, both public and private from fire, insects and disease." Since then, efforts have been made to assist local residents in protecting their lands. As long as the Black Hills beetle was just maintaining its population, control measures were of some help. In 1961, however, there was every indication that the beetle population was exploding, reaching epidemic proportions; now in 1962 there are indications that this epidemic will continue.

What values are involved when considering the control of the beetle? Frankly, the lumber products on the area affected are strictly second priority. Because of the scenic and recreational opportunities and watershed and soil erosion aspects, timber harvest is not, nor will it be, of great importance.

Yet, should we permit these lands to be ravaged by the Black Hills beetle? The sentiment of the people of the state is "no." Reduced tree cover on the watershed will affect the out-of-county and out-of-state citizen who not only depends upon the water but also "recreates" in the forested portion of the front range.

The citizens owning the land infested have recognized their duty also.

Approximately \$19,000 has been raised locally as their share of the \$60,000 program. Of what value is their land minus the trees? How is the tourist business in a severely infested area with great numbers of trees dying? Then, too, land owners depend upon the watershed for their own supply.

Action must be taken in 1962, for the 12,000 trees presently infested will emit enough beetles to attack 40,000 to 60,000 trees this summer. In 1963, three to five times, or 200,000 to 300,000, more would be susceptible, and so on. The time to knock out the beetle is May and June, 1962, and we had better be certain that we do a lot of damage to the beetle.

Here are some questions to ask yourself: "What is known about spraying for Black Hills beetle?" "Why not load a plane with DDT and just spray the whole area?" We wish it were that simple. Unfortunately, the beetles are under the bark and therefore, DDT doesn't help a bit if sprayed from aircraft. The chemical to be used is ethylene dibromide (EDB), a fumigant. It is applied to the tree trunk by hand sprayers at specified pressures in a manner to reduce waste. Large trees need treatment twice because of their thick bark. Crews and especially their leaders must be well trained to do the job satisfactorily.

Is DDT helpful at all? Yes, if a landowner has particularly valuable uninfested ponderosa pines. A 2% solution can be hand sprayed on these trees to a height of 25 feet. Beetles landing on these trees will be killed. This must be done before July 10 as beetles fly soon after. It is impossible to spray all trees in this manner, so trees harboring the beetles over the winter must be treated with EDB.

Incidentally, EDB will not damage fish, wildlife, livestock, or for that matter people. There is a little residue. Of all the insecticides, EDB is one of the safest.

A very remarkable climatic condition occurred in January which may help us in June. Remember that cold spell? As I recall, we had temperatures as low as -32° and -28° for several days on end. The interesting thing here is that we hope the beetle larvae, just under the bark of the pines, actually froze to death. Our surveys are now showing that some were killed. How many? Not

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all results are in, but in some samples over 50% of the larvae are dead. What a savings this could mean, not only in money and hard work, but also in trees!

We must be realistic however. If 12,000 trees are infested now and this number represents a four-fold increase over last year, we can estimate that 3,000 trees were infested in 1960. If 75% of the beetles are dead because of weather, we still have enough beetles left alive to infest another 12,000 trees this summer, so we are right back where we started.

In the past, control measures were pretty well disorganized. The control program in 1962 will be closely co-ordinated. The U. S. Forest Service will treat their lands; Denver Mountain Parks have already started on their holdings; and the private Mountain Parks Association, representing 2,300 landowners, will continue their active spraying program offering not only their experience, but funds as well.

The Colorado State Forest Service with technical personnel, equipment, and funds for labor and insecticide will direct the overall operation to make sure that beetles are reduced to the lowest possible population.

If ever there was an example of democracy in action, this is it. The people and their city, county, state, and federal governments are cooperating to protect a most valuable resource. The job at hand is large, but by working together it will be done.

Exotics of Colorado...

The MAGNOLIA

DR. HELEN MARSH ZEINER

IT IS NOT LIKELY that the magnolia will ever appear on a list of recommended trees or shrubs for the Denver area. Nevertheless, a surprising number of magnolias are grown here in sheltered locations. It will be of interest this spring to see how the severe weather of early January affected these tender trees, some of which have been growing for a number of years.

These magnolias are mostly varieties of *Magnolia soulangeana*, which is a hybrid produced by crossing two Chinese magnolias. Although the parents of *M. soulangeana* are natives of China, they are also grown in Japan; it was from Japan that they were brought to

this country. It is reported that the parent trees were introduced into the southeastern United States during the 1800's, even as early as 1804. Since the climate of the southeastern United States is quite similar to that of their native Orient, magnolias proved to be very successful imports. A number of varieties of *M. soulangeana* have been developed by our plant breeders and are commonly grown in parts of the United States with a more favorable climate for magnolias than that of Colorado.

M. soulangeana and its varieties are small trees or large shrubs bearing very large and handsome flowers in various

shades of pale rosy purple, often lined with white, and rarely all white. In this area the tree seems to survive if sheltered, but the flower buds form very early and are often frosted before they have a chance to open or just as they are opening. When they escape freezing and bloom, in April, they are exquisite. The magnolia owner of the Denver area, like the owner of other tender plants, needs to have some gambling instinct. If blasted brown

buds are going to ruin your spring, avoid magnolias. If you are a true magnolia lover, can shrug off the disappointment of ruined blossoms, and have a sheltered spot, you will probably think that the years when the magnolias bloom are worth the chance.

Just remember, it isn't a matter of "when the sweet magnolia buds begin to blossom," but *will* the sweet magnolia buds begin to blossom.



DENVER BOTANIC GARDENS Plant Auction and Sale

ANNA R. GARREY

YOUR Denver Botanic Gardens will try an experiment this year; the success or failure of it lies in your hands. The time — May 25 and 26, 1962; the place — the Mall, Cherry Creek Shopping Center; the occasion — the annual Plant Auction and Sale.

Many of us have felt for some time that Denver Botanic Gardens could be of increasing service to the public by acting as a medium of communication between garden lovers and the distinguished plant growers and scientists of this area. What a wealth of knowledge and experience we have here, with such specialists as George Kelly, Harry Swift, the Wilmore families, Bill Lucking, Mrs. Ruth Ashton Nelson, M. Walter Pesman, and many others, in-

cluding our own director, Dr. A. C. Hildreth, whose long years of experience in the field of Rocky Mountain horticulture have made him a world authority on the subject.

For some months now our committees have been conferring with local nurserymen and growers, for we do not wish to find ourselves as competitors with the trade, but rather as aides in the introduction of fine new and unusual trees or plants. Our questions have been these: "What trees or plants, not commonly in use here, can be introduced in this area?" "Which are the best of the tried and true?"

Botanic Gardens has already made an evaluation of one familiar friend, the petunia, to determine the best among

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some 200 varieties. (You have noticed their gay presence on York Street during past seasons.) After consultation with our specialists, seeds of these and of many other interesting and fine annuals and perennials were ordered and are now being grown locally for the Plant Auction and Sale. Interesting trees and shrubs, evergreens among them, have also been ordered. Due to the late date of the sale they will be offered in containers.

We hope that you will delay your purchases until that time, for, being intelligent Rocky Mountain gardeners, you already know that you will not want to be among those novices who bet on the weather in the matter of getting their annuals out in order to beat their neighbors. We are, therefore, counting on your being as wise as our native cottonwood trees, who know their business as to timing; they never get nipped by late frosts.

We plan our usual Plant Auction and Sale so that canny bargain hunters may satisfy their desires. We plan

other features, still a secret. Indeed, we plan an annual "Gardener's Day," a meeting of those who know and those who wish to learn how to grow gardens in Colorado. Experts will be present to answer questions about your aphids, your fungi, your leaf-rollers, your viruses, your nightcrawlers, and your undefined and mysterious diseases. I almost forgot to mention your infestation of slugs, those tenacious and abhorrent tenants who hide so artfully in shady corners. And what of your sun, your shade, your soil, your failures, and your successes? We shall speak of all these.

We believe that with your wholehearted support this traditional meeting of friends may develop into a really imaginative and constructive contribution to gardening in Colorado. This, however, depends upon you.

Come and buy. Come and be a part of Colorado gardeners' days at the annual Plant Auction and Sale at the Mall, Cherry Creek Shopping Center, on May 25 and 26.

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Building and Maintaining a **GOOD LAWN *in* COLORADO**

GEORGE W. KELLY

This is the first of a series of articles dealing with lawns, prepared by members of the Swingle Study Groups. Following articles will be concerned with seeding, care of new lawns, control of weeds, insect pests, and diseases, and lawn repair.

IN THE LAST few years there has been much learned from the Japanese gardens in the use of ground covers other than grass. Still the use of grass to cover bare ground around our homes and in parks will always be appropriate as a means of reducing reflected heat from the sun and adding needed humidity, as well as the usual uses, to walk and sit on and to enjoy its green beauty. In this area nothing has been discovered in the way of living ground covers that is cheaper to install or easier to maintain than a good blue-grass lawn.

There has been much confusion and difference of opinion among the "experts" as to the best methods of preparing and maintaining a good lawn in this area. Here an effort is made to combine and clarify the many different ideas and to give the public a clear statement of the essentials and also those things which may be done in one of several ways. Many differences in lawn-care information have come about through the efforts of various commercial companies to sell more of their products. Here is presented a "program" for lawns that is designed for the benefit of the homeowner.

A few general essentials might be stated before going into detail of the main divisions of lawn construction and care. The first thing to remember is that lawns, especially in this area, to be healthy, beautiful, and carefree, must be deep-rooted. In order to be deep-

rooted there must be available food and water, down deep, which the roots may reach. Probably the next most important consideration is watering, since the lack of sufficient natural precipitation is the main condition that makes gardening in this area different. Two general rules might be given here:

1. Water more thoroughly and less frequently.
2. Water only when needed and not by routine. (If you don't know when a lawn needs watering, dig in and see.)

PREPARATION OF THE SOIL BEFORE PLANTING

Preparation is the most important factor in establishing a good lawn. At least half of the success of a lawn depends upon proper preparation of the soil before planting, because little can be done to the underlying soil in all the years to follow. At least half the cost of the new lawn should be in the preparation of the soil. More often this is the most neglected item, because there has been little budget reserve for a lawn in the total building program. Then the lawn is put in as cheaply as possible. There is a continual fight so long as anyone lives on the place to feed, water, weed, and repair, for there is nothing to encourage the grass roots to penetrate deeply.

The important considerations in preparing the soil for a new lawn are these:

1. Remove rubbish, plaster, puddled soil from wet-weather construction

operations, or impossible subsoil. If existing soil is very bad, it would pay to remove it to a depth of six inches and replace it with good loam. (The importance of the much publicized "soil testing" is questionable. Actually a good gardener in this area can usually tell more about a soil by looking at it and feeling it than by a chemical test. We know that a majority of our soils need more nitrogen, phosphorus, and organic matter and that their pH ranges from very alkaline to neutral. The usually recommended application of nitrogen, phosphorus, and organic matter will normally do all that can be done to improve this condition.)

2. If bindweed or other deep-rooted persistent weeds are present, their treatment and removal are first considerations. It is much easier to treat bindweed before there is a new lawn growing than afterward.

3. Supply all of the organic matter that can be incorporated into the soil. Almost all of our western soils are deficient in organic matter, and the addition of suitable types of humus-forming materials will improve all of these soils. This organic matter may be manure, peat, compost, or leaf-mold; but often rough manure is easiest to get, is cheapest, and contains more plant food as well as organic matter. There is always the calculated risk in using manures of bringing in many kinds of weeds, but these are usually annuals which are destroyed with the first frost. Peat moss is sometimes easier to obtain and may be cheaper than other forms of organic matter. It is perfectly safe to use in any quantity that can be mixed with the soil, but it must be understood that it has no food value. The effect of peat is entirely physical—to loosen and increase air storage capacity in hard clay soils or to give water-holding capacity to sandy soils.

Sawdust, wood chips, and shavings may be used; but as these are slow to break down and rob the surrounding soil of nitrogen in the process, some supplementary nitrogen should be added when they are used. About one-half pound of actual nitrogen to every 1,000 square feet should be sufficient.

Most of our soils need additional phosphorus. As phosphorus in the form usually applied does not readily move in the soil, it is well to add twenty to forty pounds of treble-superphosphate to every thousand square feet of area at the same time that the manure is applied. This will stay near to where it is put until the grass roots need it, and it cannot be efficiently applied from the surface after seeding. Fertilizer manufacturers are now working on other forms of phosphorus which they claim will leach in from the surface. Our soils also need nitrogen, but this is readily supplied later from the surface as it is needed. If nitrogen is applied when the grass roots are not ready to use it, much may be leached on out of the topsoil and wasted.

If there is a limited budget allowed to put in a lawn, it is a good practice to put in only a part of the area at one time and to put it in properly. Then rake in some seeds of annual ryegrass, or even oats, in the remainder of the ground. This will give some green, hold down the mud and dust, and provide very valuable green manure to be plowed under before the ground is prepared to plant the permanent lawn. Even when the budget will allow, it might be better to put in a large area in sections, a few weeks apart, so that more attention can be given to the necessary "watering-up."

4. The deeper the soil is worked up, the better will be the lawn that results. Eight inches might be the goal—deeper is better and less is not so

good. The amount of organic matter that can properly be incorporated into the soil might be according to this rule: one yard to every 1,000 square feet for every two inches in depth that the soil will be worked. For instance, if the soil can be worked six inches deep, three yards of organic matter per thousand square feet can be spread on the surface and worked in.

Rototilling mixes this soil in a good manner but often does not work it up so deeply as it appears. It takes a powerful rototiller and soil in good condition to be able to work up even six inches of hard soil. For "real good" preparation of the soil it would be well to put on two or three yards of manure per thousand square feet. Till this in as thoroughly and as deeply as possible, then turn it all over with a plow to a depth of at least eight inches. Apply one or two more yards of manure and till again. This will give a deep, loose seed bed with lots of plant nutrient down deep where the roots may find it. Another method of breaking the soils up deeply is to run over it with a ripper to a depth of a foot or even two. This is considerably cheaper than the former method, but not quite so effective. Too often little is done toward working the soil deeply or adding organic matter; then the owners hope to have a good lawn by adding an inch or so of questionable topsoil.

5. Now the rough grading should be done. A slope of at least one-third of an inch to a foot should be maintained, away from the house, for at least fifteen feet. Steep slopes should be avoided. Often a wall or terrace will eliminate a slope which is too steep, or a rock garden may be called for. This rough grading is usually done by a contractor.

6. Another operation necessary when preparing an area around a new

home or putting in a new lawn should be to thoroughly settle-in with water all back-filled areas around the foundation and trenches where utilities have been put in.

7. At this point would be the time to install an underground sprinkling system if that is wanted. Be sure that all trenches are properly settled.

Again, let me emphasize that half the work and expense of putting in a new lawn should be at this point. Only a wealthy person can afford to put in a lawn cheaply, without this thorough preparation of the soil. If contracting to have a lawn made, do not consider the lowest bidder; for surely the cheaper cost will be at the expense of thorough soil preparation. A lawn put in cheaply may have the soil worked up only a couple of inches deep, yet, when the work is finished, only an expert, who digs in to see, can tell it from a well-prepared seed bed. Lawns prepared correctly, as above, will cost more. (The total cost of putting in a lawn should be governed by the methods used and the thoroughness of the work done rather than by a set rate per square foot.)

After the above preliminary preparation of the soil, the final fine grading should be done. This can be done with some of the modern tractor attachments but is more fun when done with the hand rake. It is an art to sculpture the soil — like doing a painting. Rather uniformly fine soil on the surface to receive the seed is desirable, although good lawns have been grown from seed put on rather coarse soil.

At this point comes the temptation to use a heavy roller. This is dangerous, for it often compacts the surface too much. There is seldom need for the use of a heavy roller if the soil is in proper condition for seeding. If it is desired to use a light roller to com-

pact soft spots the surface should be re-graded and raked following its use before seeding.

An even better method to insure no sinking spots is to make the soil suitable to work and to supply deep moisture by the practice of pre-watering. A thorough deep soaking is given the lawn right after the first finished rak-

ing. This will delay the seeding a few days, to allow the topsoil to dry enough so that it can be raked again, but will give a better lawn in the end by eliminating sinking spots, by supplying deep moisture, and by helping to break up clods. There is often the additional benefit in pre-watering of starting many weed seeds which will be destroyed in the final raking.



My Hobby Greenhouse

MRS. ESTHER HOLTZ

ANY GARDENER WHO enjoys having a garden in the summer will find double pleasure in a greenhouse, as it gives pleasure all year. Also, one need not be an outdoor gardener to enjoy a greenhouse; to me it is really the easy way to garden because one can control the weather!

My greenhouse consists of two sections, joined to have a total length of 17½ feet; it is 5 feet 3 inches wide. It is the lean-to type on the south side of my home in Boulder, with a door from the dining area into it and a door on the west end which leads to my back yard. This door is closed during the winter months, and temporary shelves are installed to take care of the surplus plants taken from my yard each fall. The greenhouse is a pre-fabricated, easily erected, aluminum model which rests on a cinder block foundation. Coarse gravel serves as the floor and cement slabs form walks. Benches are built of sturdy redwood and I had sheet metal trays made to hold my pots. As yet I do not have a deep tray for direct planting, but I hope to have such in the near future. Additional shelves are put up easily by using cinder blocks or glass bricks and redwood boards. The

lumber yards are gracious about cutting any lengths desired.

My greenhouse does not have ultra conveniences, but I feel it is well equipped. Water is piped in and there is an excellent overhead sprinkling system as well as an automatic roof vent. The vent enables me to be away a few days at a time if I wish. The roof and south side of the greenhouse are covered with ice-blue, smooth fiberglass. The blue is not visible, so that the effect is a frosted white. This fiberglass has been very satisfactory, as it prevents plants from burning during the bright summer days. The west and east ends are of clear glass; but it has not been necessary to cloud this glass to keep such plants as geraniums from burning.

Much of the heat for my greenhouse comes from the house through the louvered door; but when extra heat is needed, I have an electric heater with a thermostat available. The whole project is a do-it-yourself idea of my son-in-law, and eventually we plan for a different heating system. Until then, I find the present system most satisfactory.

This is my third winter for enjoying

my hobby, and from experience and application I am learning many things. The door from the dining area is an aluminum storm-door with louvered glass which I remove in summer and replace with a screen panel to prevent insects from entering the house. The door is painted the color of my walls and is a real asset. These stormy mornings when the temperature outside is 15 or 20 degrees (sometimes below zero), through this door I see blooming azaleas, cyclamen, gloxinias, geraniums, petunias, and other plants. The late-blooming, exotic, and exhibition type chrysanthemums have finished blooming and have their tops cut back. They are now under the benches and are watered occasionally.

Insects, humidity, temperature, and light are, of course, much easier to control in a greenhouse. Many plants impossible to grow outside in this area and others difficult to grow in our homes flourish in a greenhouse. Because the problems of insufficient light and humidity are greatly reduced, plants grown in a greenhouse take less work. The temperature and light vary in different parts of the greenhouse, so a large variety of plants with different requirements can be grown. With some planning and not much extra effort a greenhouse can present a constantly changing scene of blooming plants.

Being a housewife, I have time to enjoy my hobby during the day and have little need for artificial lights at night. But it is always a pleasure to show my greenhouse day or evening. Just finished blooming are two poinsettia plants, one white and one red, with some bracts measuring 10 inches across. These plants were given no special care except to have darkness at the normal time during the fall and early winter evenings. Not being in-

terested in any specific genus or family of plants, I have a wide variety growing happily together in my greenhouse—ivies, succulents, cacti, scented geraniums, gesneriads, rex begonias, ferns, foliage plants, and others, plus those mentioned above. I have Gerbera daisies grown from seed. These were put in the garden for the summer, but I find they like being in pots in the greenhouse better. I have several orchid plants which give enough pleasure and interest to continue with them. However, I feel the environment is cool for orchids during the winter months.

Last spring was my first experience growing bedding plants. Some, I feel, were started too early and had to be cared for too long before our ground was warm enough to be planted outside. Ruffled and double petunias were the most satisfactory. All my seedlings were placed in ferto-pots when large enough and later planted outside. (I make an effort when placing the ferto-pots in the ground to punch large holes in them so that the delicate root may readily enter the soil.) Many of my petunias I take up in the fall and cut back for the greenhouse; their blooming adds much color during the winter. Last winter I forced tulips, hyacinths, paper white narcissus, and daffodils very satisfactorily. This season, as I was gone several weeks, I have only freesias. Waiting in my basement to be started are gloxinias and amaryllis.

Anyone getting a home greenhouse will be surprised and delighted at the many plants coming from friends. I have many interesting species given to me here in Boulder. The usual cry is "This won't bloom for me, perhaps it will in your greenhouse" or "This has grown so large I don't want it any more." Indulge yourself and you will have no end of pleasure.

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THE COVER

TULIP

Hort. var. of *Tulipa*

Photo Courtesy of
The Bulb Growers of Holland

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m.

KLZ Radio. The Green Thumb

Program by Herbert Gundell,
Denver County Agent

Every Saturday Afternoon — 4:30 p.m.

KLZ-TV, Channel 7. The Weekend
Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE MAY

2nd — Wed., 7:30 p.m., Botany Club

3rd — Thurs., 7:45 p.m., Orchid Society

4th — Fri., 1:00 p.m., Civic Garden
Club Presidents' Tea

7th — Mon., 9:30 a.m., Denver Botanic
Gardens — Junior Committee
1:30 p.m., Metropolitan Area
Commercial Dealers Educa-
tional Meeting. Herbert Gundell

8th — Tues., 10:00 a.m., Herbarium
Study Group

9th — Wed., 7:30 p.m., Landscape
Contractors

10th — Thurs., 8:00 p.m., Rose Society

14th — Mon., 10:00 a.m., Judges' Council
6:00 p.m., Landscape Architects
Pot-luck Supper

15th — Tues., 1:00 p.m., Rocky Mountain
Area African Violet Council

16th — Wed., 9:30 a.m., "Fun with
Flowers" Workshop

17th — Thurs., 10:00 a.m., "Around the
Seasons" Meeting

18th — 7:15 p.m., Denver Nursery School
Association. Dr. Hildreth

18th — Fri., 2:00 p.m., The Green Thumb
Editorial Board Meeting

21st — Mon., 4:00 p.m., Denver Botanic
Gardens Board Meeting

21st — Mon., Tues., & Wed., 8:30 a.m.,

22nd Landscape Design School

23rd Mrs. Glenn, HA. 4-1190

23rd — Wed., 7:30 p.m., Landscape
Contractors

24th — Thurs., 1:00 p.m., Civic Garden
Club, Div. A., Luncheon Meeting

27th — Sun., 2:00 p.m., Colorado
Cactophiles

31st — Thurs., 1:00 p.m., Ikabana
International Meeting

JUNE

4th — Mon., 9:30 a.m., Denver Botanic
Gardens Junior Committee

5th — Tues., 10:00 a.m., Mountain View
Garden Club Workshop and
Luncheon

6th — Wed., 7:30 p.m., Botany Club

7th — Thurs., 7:45 p.m., Orchid Society
10:00 a.m., Colorado Federation
of Garden Clubs State Board
Meeting

8th — Fri., 10:00 a.m., Iris Garden Tour.
Mrs. Jess Gibson

NOTES AND NOTICES

**PLANT AUCTION AND SALE — Friday and Saturday, May 25 and 26th on the Mall
in the Cherry Creek Shopping Center.**

ANNUAL GARDEN TOUR — Wednesday, June 27. Watch for details in the June
issue of THE GREEN THUMB.

LANDSCAPE DESIGN STUDY COURSE I — All members of the Colorado Federa-
tion of Garden Clubs, Inc., Home Demonstration Clubs, park supervisors, nurserymen, and
others interested in landscape design are invited to take the course. Any person may register
for the school, but only Garden Club members are eligible to take the examination if they
wish to do so. The course will be given at 909 York Street, Denver, May 21, 22, and 23.
Instructors will be Mr. M. Walter Pesman, Mr. Stanley H. White, and Miss Julia Andrews.
For information and registration blanks, contact Mrs. Robert Glenn, 10433 W. 62nd Ave.,
Arvada, Colorado. Phone HA. 4-1190.



Consider Plant Rusts in Your Plans

ROGER S. PETERSON¹

IN THE 17th and 18th centuries farmers asked for laws banning the common barberry near wheat fields—they believed that somehow the destruction of their crop by rust was greater near barberry. Scientists pooh-poohed this superstition, but science was not so highly regarded then as now; the laws were enacted in France, Denmark, and New England.

The farmers were right, the scientists wrong. In the early 1800's an English horticulturist and a Danish schoolmaster demonstrated the passage of stem rust from barberry to wheat. Anton de Bary in 1864 proved that the disease is caused by a fungus which requires these unrelated hosts to complete its life cycle.

Since de Bary's time it has been shown that the stem rust fungus is by no means unique. Over a thousand kinds of host-alternating rusts are known, almost a hundred of them in Colorado. Not all require both hosts



Figure 1.—A ponderosa pine being killed by limb rust (*Cronartium* sp.) in Estes Park. Indian paintbrushes (*Castilleja*), the alternate hosts, surrounded the tree.

for continued existence, but many of them do much more damage if the two hosts are grown together. For this reason farmers eliminate European barberry from the vicinity of wheat and other grains, buckthorn from oats, and saltgrass from spinach. Leaving these pairs of rust hosts results in unnecessary loss of crops.

In lawn plantings and gardens, rusts on badly paired plant species can disfigure shrubs and trees and less commonly cause injury to non-woody plants. Probably the most familiar example in Colorado is infection by a group of rust fungi, species of *Gymnosporangium*, alternating between junipers and members of the rose family—hawthorns, serviceberry, quince, pear, and others (but not roses). *Gymnosporangium* on juniper causes globose galls, “cedar apples,” broom-like branch proliferation, or branch can-

1) Plant Pathologist, Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, with headquarters at Fort Collins, Colorado, in cooperation with Colorado State University.

kers, depending upon fungus species; on the rosaceous hosts leaves or fruits are attacked and sometimes caused to fall prematurely. The plants are seldom killed. But why accept any damage at all when forethought in planting could have separated these rust hosts?

It has been suggested in THE GREEN THUMB that kinnikinnick, *Arctostaphylos uva-ursi*, makes a fine cover plant, and so it does. It is also the alternate host for witches'-broom rust of spruce (caused by a *Chrysomyxa*). Whether this forest rust will flourish in a city is not known, but it does deform and even kill blue spruce along streams not far above the plains and has damaged ornamental spruce in Estes Park.

A group of handsome wildings, the Indian paintbrushes, has also been recommended for garden use, again justifiably. These plants, however, are hosts to a limb rust (cause by a *Cronartium*) which kills ponderosa pines. It is recommended that paintbrush not be planted near pines of this species.

Pinyon pine suffers from two rust fungi, a *Cronartium* on stems and a *Coleosporium* on needles, which complete their life cycles on currants and gooseberries, *Ribes* species. This needle rust is common in Colorado and is a threat to the vigor and beauty of pinyons, though it doesn't kill them. Another *Ribes* parasite is white pine blister rust, introduced at Vancouver,

British Columbia, from Eurasia in 1910. It has not yet reached Colorado, but its progress in our direction has averaged 20 miles a year; on *Ribes* it is now known as close as Laramie, Wyoming. Unlike the other fungi discussed here, this non-native pest is not at all "in balance" with its environment, but is a serious killer. In the next few decades we can expect it to reduce the limber pine stands of the high mountains (unless expensive control measures are undertaken), and ornamental white pines growing near *Ribes* may be lost. For this reason planting limber pine, which is otherwise one of the best trees for the foothills, is not recommended. Bristlecone pine, another Colorado native, is somewhat resistant to the rust; pinyon and the hard pines (ponderosa, lodgepole, and exotics such as Scotch and Austrian pines) are never infected.

A needle and leaf rust frequently encountered from 6,000- to 8,500-foot elevations alternates between Douglas-fir and species of *Populus*. Leaves of narrowleaf cottonwood and aspen growing near Douglas-fir are often turned yellow and brown by this rust, but no permanent damage is known to result. Few needles of the conifer host are infected under Colorado conditions.

About half of Colorado's many host-alternating rusts infect grasses as one

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set of hosts. The only grass rust likely to come to home gardeners' attention is a *Puccinia* alternating between blue-grasses (especially Merion Kentucky bluegrass) and members of the buttercup family — meadow rue, larkspur, clematis, columbine, and others. Unfortunately the spores of this rust are so abundant in the air and the host species so numerous that separation of the hosts is not a practical control measure.

Fungicides provide a possible defense against the host-alternating rusts as well as against one-host rusts (such as those on rose and hollyhock). Because only occasional years provide weather favorable to heavy rust outbreaks, the use of fungicides is not a burdensome chore. It would be foolish for me to remove the big Rocky

Mountain juniper among the apple trees in my back yard; it is easy to clip the rust galls from the juniper, and if the fungus should ever begin to damage the apple, fungicidal sprays would take care of it. (Fortunately no serious rusts of apple occur further west than Iowa.)

Although fungicides are possibilities, and some rust-resistant varieties—especially of juniper—can be bought, it is more practical to admit that host-alternating rusts are here to stay, and to plant accordingly. Each additional foot of distance between the alternate hosts makes it less likely that rust spores produced on one will be blown to the other host. For most rusts in town, 100 feet—or better 100 yards—between hosts reduces the chance of serious infection to almost nothing.

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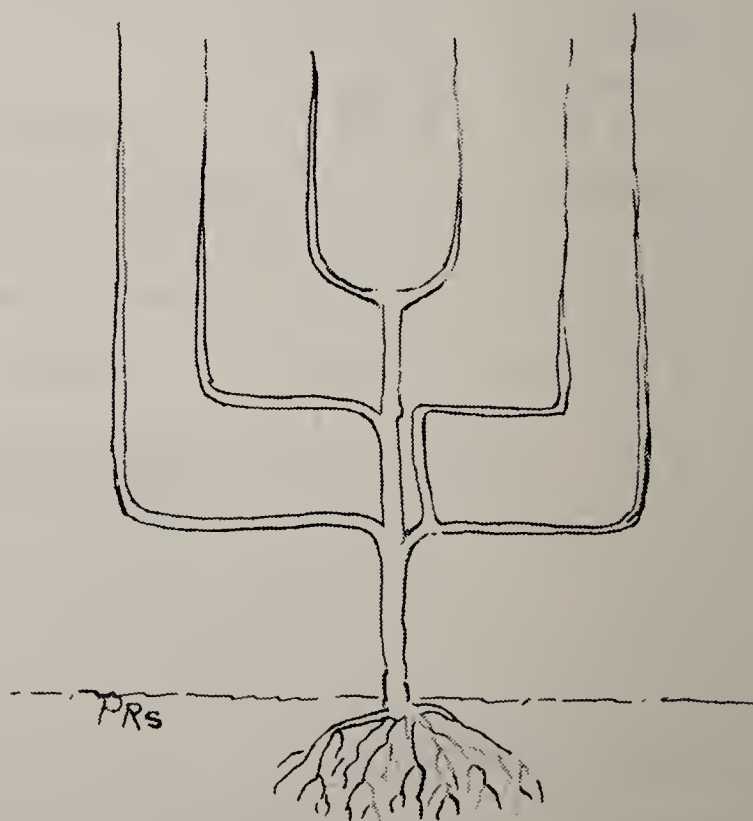
Espaliers are very effective against a chimney or large, plain wall. Trained around a window the plant's fragrant blossoms are within a nose's scent. Espaliers may be used as a focal point, to screen unsightly objects, as living fences, or as archways. The patterns illustrated have been developed for more than a century. They are only suggestions.

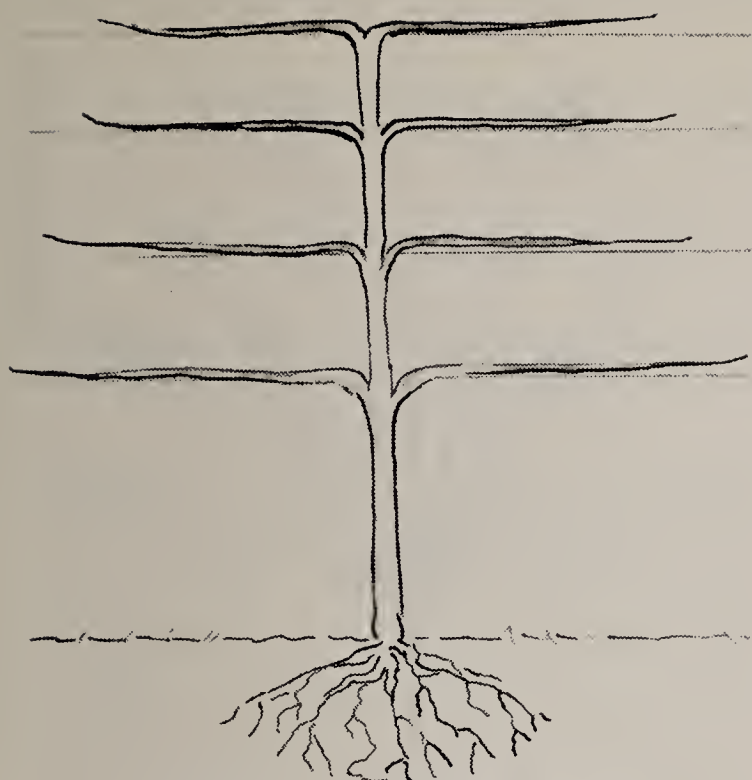
Begin with a whip or seedling if you want to do-it-yourself. Local nurseries offer trees that adapt readily. One out-of-state specialist offers espaliers from whips to triple-U's six feet tall.

When planting, use good soil with a little peat or humus incorporated to a depth of at least 18 inches. If planting next to a building be sure the contractor's rubbish has been removed. Don't use fertilizer for at least a year. Cut back the top, or leader, to encourage branching. Leave three buds at the top, the two opposite buds for branches and the front one for the leader. Let the lowest branches develop about 12 inches above ground unless you must avoid covering a base-

ment window. Space the branches or arms about 10 to 12 inches apart if they will grow that way. Bend these arms when quite flexible to get the desired angle. However, arms bent too early might break from the trunk.

Authorities say that by puncturing a bud with a sharp instrument, such as an ice pick, or by cutting straight through the bud vertically and then wrapping the wound with damp peat or sphagnum moss and covering it with pliofilm, a branch can be induced to break. (My attempt was unsuccessful.) Sometimes a branch will break close to the trunk on the next lower branch. This branch can be brought up parallel with the trunk and turned where the desired arm should appear. The substitution will be unnoticed.





TRUE ESPALIER

As for mechanics, most authors recommend building a framework of pipe with an airspace about six inches or a foot from the wall. Some recommend spikes or flanges fastened into wood or brick, or pipe fasteners used with rubber, leather, or cloth between the fastener and the branch to prevent injury to the bark. Although efficient, this is cumbersome.

Wayward vine supports have been very satisfactory and attach inconspicuously to brick or masonry walls. Carefully avoid choking the branch and gradually lift the metal from the branch to avoid plant injury. As the branches enlarge fasten cord or cloth strips through the metal loop and around the branch. Actually, after the branch has been trained a year or more, it needs little support to retain the proper angle. Optimistically, heavy fruiting might cause the plant to topple, unless it is fastened.

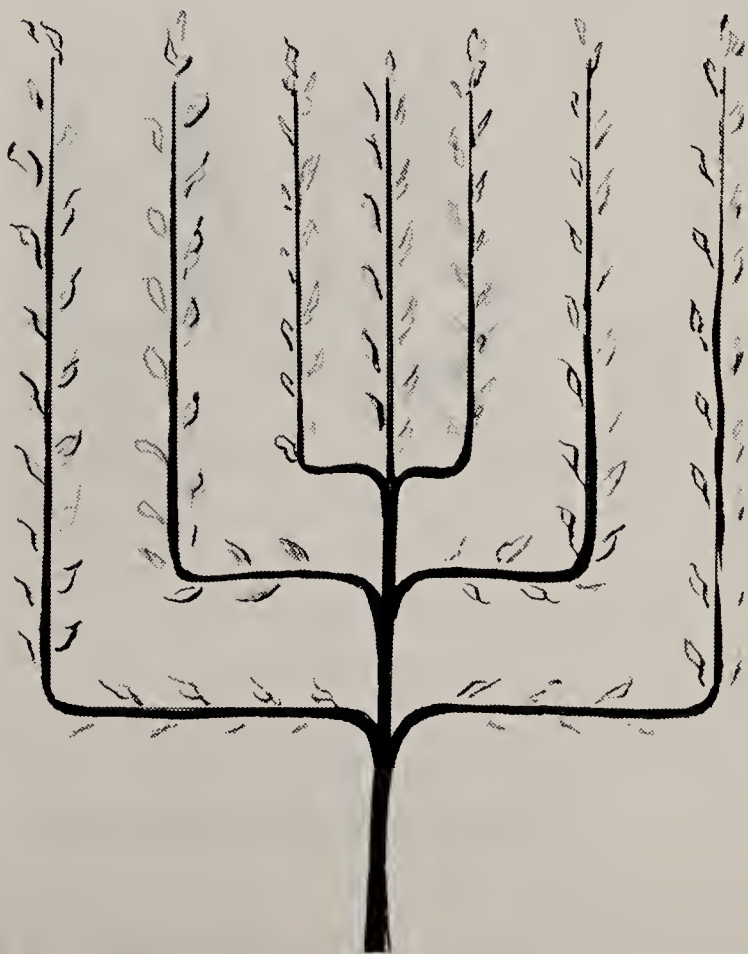
Another hint, if the plant is on an east, west, or south exposure, wrap the trunk with tree wrap for the first few winters to avoid sunscald.

Periodically growth on the spurs or side shoots should be pinched to four

inches. (Some experts recommend two and a half inches; others say five leaves.) However, if bearing spurs develop on a side shoot when the shoot is longer than four inches let it bear fruit first, for a tree requires three years to produce a bearing spur. Foliage is essential for a healthy plant, but not to the extent of destroying the plant's pattern.

What plants will train, and where? Plants, like people, have definite traits, attributes, and patterns of growth. To discipline a plant one should understand the species being trained — its requirements for growth, its habits, whether it will remain in scale, whether it produces flowers, fruit, or berries, its foliage color, if it is hardy or tender, and whether it suckers.

The north exposure is ideal for *Euonymus radicans*, pyracantha, winter jasmine, ivies, and small fruit trees. To produce fruit, plants require a minimum of five hours sun, so fruit might be sacrificed on this exposure.



GRIDIRON

An east wall, as you probably know, is ideal for growing most plants; morning sun is very beneficial. Here plants escape the burning rays of our hot two-o'clock sun. Small crabapples will thrive. Downy hawthorn, *Crataegus mollis*, trains readily and is one of our most beautiful small trees. Dwarf cherry is slow and difficult to establish, but very satisfactory. Peach is a rather short-lived plant, although some people find, with vigorous pruning, it will survive 18 to 30 years. Often a key branch dies and destroys the plant's symmetry. The late Mrs. L. V. Woods espaliered both peach and apricot in a southern exposure with high shade for protection. Pear trains beautifully, but is subject to fireblight and is seldom hardy here. Purple-leaf plum, either *Prunus cistena* or *P. hybrid* 'Newport,'



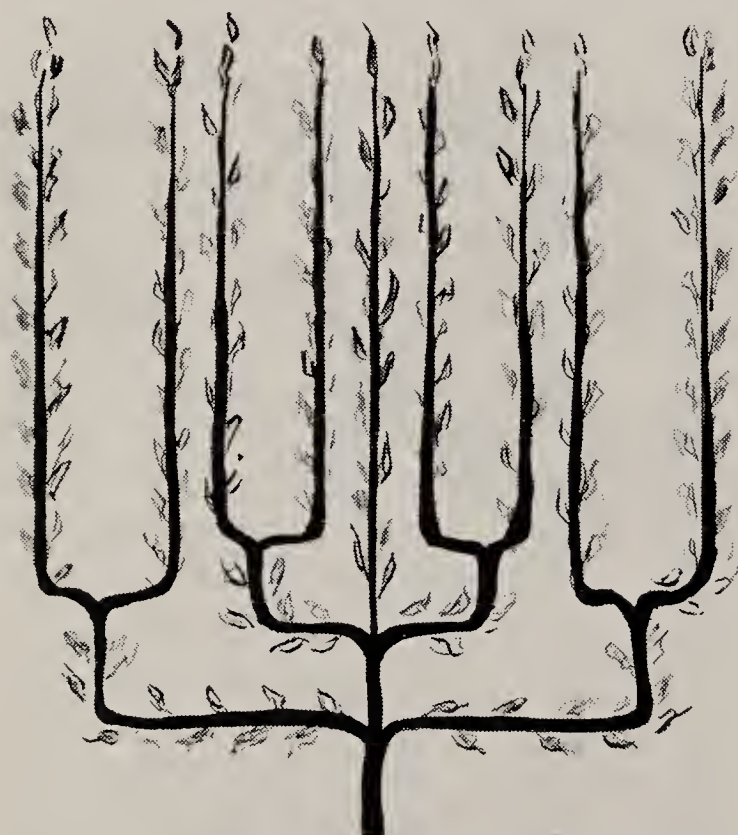
FAN

is effective against white or light-colored buildings. Forsythia and pyracantha are good subjects here.

Although south and west locations are difficult with our bright sunshine and hot, dry air, Russian olive, with its soft grey foliage, is delightful there. However, it is harmful to hay fever and asthma sufferers, and its odor might be offensive near a window. Downy hawthorn, purple-leaf plums, and Persian lilacs would be good.

Other plants to try at various locations include flowering almond (both pink and white varieties grown on their own rootstock), flowering quince, dwarf burning bush, currants, gooseberries, and grapes.

Won't you try to discipline a plant? It may be stubborn, but it will never talk back.



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Shrub Portraits

GEORGE W. KELLY

BEAUTYBUSH

TWENTY YEARS or more ago there was a great deal written about the beautybush, *Kolkwitzia amabilis*, but in recent years it is seldom mentioned. It makes a growth comparable with the bush honeysuckles. The flowers are pale pink, borne profusely, and make their showing at a time when few other things are in bloom, right after the big June show of bloom. It is a little fussy as to soil and location, but in a situation that it likes it makes an interesting display.

ROSE ACACIA

Some may criticize my suggesting this weedy little shrub, but it really has its place; in that place it should be used more. It is a locust, *Robinia hispida*, but since it never develops a large woody stem it is not generally attacked by the borers that make the growing of other *Robinia* species impossible here. It does sucker freely, so it should only be planted for a wild effect or in a place where suckering would be an advantage. Its good quality is in its grand display of flowers in spring. These are large pink clusters of pea-like blooms hanging on in great profusion. The plant is always loose and informal in growth and seldom grows over four feet tall.

EUROPEAN COTONEASTER

For many years we have known and appreciated the Peking cotoneaster, *Cotoneaster acutifolia*, and have tried with indifferent success to use a similar

plant that has red fruit. *C. horizontalis*, *C. divaricata*, and *C. apiculata* do not quite fill the requirements, either because of their low growth or doubtful hardiness. The European cotoneaster, *C. integerrima*, is about the same size as the familiar *C. acutifolia*, is equally hardy, and does have persistent red fruits. The habit of growth is a little more irregular, but with just a little trimming it makes a very nice medium to large shrub. Like the other cotoneasters this plant has only small pinkish flowers, but its neat habit, red fruits, and adaptability make it one of our most valuable shrubs.

HERCULES CLUB

This is a rank, tropical-looking plant with very large, doubly compound leaves. It is also known as devils walkingstick and angelrea-tree. Botanically it is *Aralia spinosa*.

In the summer hercules club appears similar to a very vigorous elderberry plant. The flowers and fruit are also similar to elderberry. It is not entirely hardy in all situations and may often die back. In the winter when the large leaves have fallen, only large stems covered with spines are left, which gives it its interesting name. It is not recommended for a neat shrub close-by the house, but for a bold, tropical effect, at a distance, it is perfect.

SEA BUCKTHORN

The common sea buckthorn, *Hippophae rhamnoides*, is in the Oleaster family with the Russian olives and

buffaloberries. It seems to be equally hardy with these more familiar relatives but is little known and grown. It is a tall shrub, often scraggly looking, and irregular. The leaves are narrow and gray, similar to the Russian olive and buffaloberry. It will sucker slowly from underground roots so it should not be planted where this is objectionable. Gray-leaved plants seem to fit especially here, so it is valuable for this character. But its chief attraction is the large masses of small, bright orange berries which persist through the winter on the pistillate plants. As the pistillate and staminate flowers are on separate plants, there should be at least one of the staminate plants in each planting to fertilize the pistillate flowers. As the flowers are small and bloom before the leaves appear, the flower buds are formed in the fall and make it possible to identify male or female plants when the plants are dormant.

This plant not only seems appropri-

ate in this western area but fills a place in the recent interest in irregular, Japanese style plants.

FLOWERING QUINCE

The common flowering quince has been used and loved for many generations. Our grandmothers called it "Japonica." Its hardiness and brilliant early flowers have been appreciated by many. It is rather susceptible to chlorosis in our more alkaline soils but is tough enough to persist anyhow.

Recently growers have introduced many new colors in named varieties. We no longer need to have only the familiar orange-red; there are now light pink, white, watermelon pink, and scarlet.

Another characteristic makes the flowering quinces useful. This is their habit of blooming all through the bush rather than just on the outside. This makes it possible to do necessary trimming and still have flowers.

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Primroses



MICHAEL ULASKI

PRIMROSES ARE perennial plants which bloom only once each year. They are low plants for the most part, herbaceous, mostly spring blooming, and produce clusters of attractive flowers usually in white, pink, and rose, but sometimes in red, blue, and yellow. *Primula* is their botanical name. They are not very well known in our gardens, but their culture is gradually on the increase as new species are introduced. Perhaps the best known are the English primrose, *Primula acaulis*, the cowslip, *P. veris*, and the polyanthus group, *P. polyantha*.

Primroses are all simple in their requirements; they grow and flower freely in any good garden soil. They are quite hardy in our area, provided they are not planted in a too exposed or windswept location. They like a rather shady location away from our hot afternoon sun. Primroses can also be forced for flowering in the greenhouse in early spring.

Primroses may be propagated by seeds or divisions. Seeds may be sown in February in pans or small shallow flats in a mixture of equal parts of loam, leafmold, and sand. The surface should be fine and the seeds should be pressed evenly into the soil and covered with about 1/4 inch of finely sifted mixture. Place the pans or flats in a warm place with a night temperature of 55 to 60 degrees and a day temperature 10 degrees warmer. Seed-

lings should start appearing in about two weeks. When large enough, they can be transplanted into other flats or small pots in the same kind of soil. About May or June they will be well-developed plants but will not bloom the first season. If they are planted together in one area until spring they will be easier to care for. Then they can be planted where they are wanted.

Seeds can be sown also in cold frames in April. Sow them very thinly in shallow drills. Water and weed these seedlings during the summer. They can be transplanted to their permanent location in late summer and will bloom the following spring.

Primroses may be propagated by division when clumps become rather large or when it is desired to increase the number of plants. This method consists simply of dividing the clumps into several parts and replanting again. The best time to do this is in late summer.

Any one of several varieties listed in catalogs are good in our area. The English primroses are excellent for mass planting on sheltered banks, or in any position where they are not too shaded and where they can be left undisturbed for several years. They make good rock garden plants when mixed with other spring flowers and ferns, and are excellent for naturalizing purposes. A light mulch of some kind is recommended for winter protection.

Do We Need Vines in LANDSCAPING?

M. WALTER PESMAN

IT IS VERY EASY to start an argument about vines. Just what is a vine? Little Johnny defined a vine as a "plant that can't stand on its own legs." Not too bad! The average Englishman restricts the name to a grape vine. Other vines to him are climbers, scramblers, twiners, or what-have-you.

If you're a college graduate, your answer to the need of vines may depend on whether you came from the "Ivy League" universities, or from Colorado State University where most buildings have been vine-proofed by having a cement walk to "protect the foundations." On the other extreme are the ivy-swathed British universities that appear to associate scholarship with a heavy coat of English ivy.

Coming closer to home, here are some statements from friend-gardeners: "I wouldn't have a garden without sweetpeas." "Vines are dirty and harbor insects and birds." "The finishing touch of a good landscape is furnished by proper vines." "I'll take grapes and climbing roses but no others." "Walls and woodwork are damaged by any kind of vine." "I think vines are great as a groundcover."

Incidentally, these statements have intimated some of the best, and worst, uses of vines.

In other words, the following purposes are generally considered as all right by most gardeners:

1. To relieve bareness of walls and fences.

2. For ornamentation, often on trellises.

3. For quick screening in summer, by annuals mostly.

4. To cover awkward slopes or other bare surfaces.

5. For window boxes and hanging baskets.

6. Occasionally for low, sheared border-hedges.

7. To clamber up on old tree trunks, porches, or arbors.

Lately homeowners have gone in for tropical vines and greenhouse climbers, such as bougainvillea, passionflower, philodendron, waxplant (*Hoya*), coralvine (*Antigonon*), potato jasmine, golden trumpet (*Allamanda*), chalice vine (*Solandra*), and Easter lily vine (*Beaumontia*), to mention some of the most beautiful ones. (Look for an article on these in a later issue of THE GREEN THUMB.)

By far the best and hardiest clinging vine for brick and cement walls is our Engelmann ivy, *Parthenocissus quinquefolia engelmanni*, derived from the regular Virginia creeper which is just as gorgeous in fall, but which lacks the clinging "pads." Another variety is the St. Paul Virginia creeper, equally good, or better, but more difficult to get. The Japanese or Boston ivy, *P. tricuspidata*, has simple, three-lobed leaves and is almost as hardy — quite attractive! On east and north walls it does best.

The name ivy to most people means English ivy, *Hedera helix*. It is almost hardy in this region (again best on east and north walls) and is evergreen; therefore, it is attractive all the year round. It has a number of varieties of which the Baltic ivy is best known.

Only one other vine, hardy here, will cling to a hard surface. That is *Euonymus radicans* and some of its close relatives.

All the other vines need to be provided with some kind of support, such as trellises, wires, clips, or nails. Clematis in its various kinds comes to mind immediately. Among them Jackman clematis has had more publicity than any other, most of it well deserved! But, please, don't plant it where its striking purple blossoms will swear at a red brick wall! It is a harsh color combination and lasts for quite a while during bloom. A good substitute in such a location is the variety Henry, with large flat white flowers — truly striking!

Other good types of the large-blossom kind are Ramona, with pale lavender-blue flowers in quantities, Mme. Edouard Andre, reddish pink, Mme. Boussilett, white, and Lady Balfour, deep blue. New varieties are coming out frequently — Nelly Moser has red bars on mauve petals; Mrs. P. T. James is double blue.

In the meantime we ought not to forget the old virgins-bower, *Clematis paniculata*, a strong grower, with a profusion of small, white, fragrant blossoms in August and September. Its native likeness is *C. ligusticifolia*, less striking in bloom but more spectacular in fruit that stays on all winter. For rockgardens our delicate *C. pseudoalpina* and *C. columbiana* (both bluish) will gradually be recognized.

Silver lacevine, *Polygonum auberti* and *P. baldschuanicum*, is sometimes

mistaken for a clematis, although it belongs to the buckwheat family and is much less dainty. It is good and hardy!

Honeysuckles are confusing to many people because they come either as vines or shrubs. Almost all of them are desirable. Bailey's *Cyclopedia of Horticulture* distinguishes twenty species of climbing honeysuckle, some tender, with flowers as long as seven inches, and many quite hardy. The honeysuckle of poetry is generally *Lonicera caprifolium*, a native of Central Europe and West Asia, with fragrant, yellowish-white flowers, often purplish outside, and almost evergreen. Hall's honeysuckle is a variety of *L. japonica*; it has white, fragrant blossoms and is a rapid grower. Gold-flame, of *L. heckrotti*, is red on the outside, golden yellow inside, and fragrant after nightfall. It is particularly good as a scrambling groundcover and blooms all during summer. Others on the market are Purple-leaf and a new one, *L. tellmanniana*, called Redgold. Unusual is the gold-leaf Hall's honeysuckle.

Is bittersweet, *Celastrus scandens*, hardy in Denver? There are a number of them scattered all over the region to prove it. And yet, some people have difficulty getting them to fruit. Some nurserymen claim it is best to plant two of them for better pollination. A new improved bittersweet, *C. loeseneri*, from China, however, is said to be self-pollinating. The fruit is so striking with its orange-scarlet berries peeping out of yellow hulls that most of us want to get it for table decoration and winter bouquets.

Two more woody vines should be mentioned: trumpetcreeper, *Campsis radicans*, with masses of scarlet trumpets in summer (Mme. Galen is particularly fine.), and *Wistaria sinensis*,

the well-known lavender-blue-clustered vine that we often associate with Chinese or English gardens. The latter is so decorative that it is well worth "babying" if necessary. We used to wait seven years for it to bloom, but now grafted vines are marketed that bloom while young. (We are told that newly transplanted wistaries may remain dormant for months, occasionally, but will start when "good and ready.")

Both trumpetcreeper and wistaria develop into thick-stemmed, coarse vines that need a strong, sturdy support until such time as they can practically support themselves. Neither has thick foliage, so they are not particularly good for screening purposes. Wistaria is occasionally trained as a small weeping tree.

Quite hardy, though preferring some shade, is a vine that is not found much in the trade, Dutchman's pipe, *Aristolochia durior*. It has large, heart-shaped leaves, somewhat like a linden, making an excellent screen for porches, arbors, etc. The name is derived from its peculiar yellowish green flowers which have a wide flaring mouth, not particularly beautiful, but strange.

For the sake of completeness we should mention matrimony vine, *Lycium chinense* and *L. halimifolium*, which is really intermediate between a shrub and a vine. It has small blue-green leaves and small purplish flowers followed by red fruit. In places where no other vine will grow, matrimony vine will succeed. It needs training since its branches seldom grow over 10 to 12 feet long.

Climbing roses and grapevines are both so well-beloved and come in so many types and varieties that we'll have special articles for each in future issues of THE GREEN THUMB. That's a promise!

ANNUAL VINES

For the growing of sweetpeas, *Lathyrus odoratus*, a sort of tradition, or ritual, has been developed. Seeds must be planted on St. Patrick's day, preferably after being soaked for twenty-four hours before. A six-inch trench is dug; seeds, placed at the bottom, are covered up with an inch or so of good soil. More soil is added little by little as the sprouts come up. Thus a good root system is developed. Flowers must be cut frequently. Heavy string is strung from top to bottom laths at six-inch distances.

What happens if this ritual is not followed rigorously? Try it! If they don't grow just right, you can blame it on not having done all that is required; if you have success, you won't care much anyway how it happened.

To a landscape architect sweetpeas are often a problem; for best summer effect they must be in a conspicuous, sunny spot, which means that the unsightly supports are spoiling some good view when not decorated with sweetpeas. The best way out would be to remove the supports when not in use.

Blue morning glories, *Ipomoea purpurea*, and others, are almost as striking. Many of them close up in afternoons, a thing to remember when deciding on their best location. For perennial types see below.

A third favorite annual vine is the scarlet runner bean, *Phaseolus coccineus*. It will provide food for your table if flowers are not picked.

Wild cucumber, *Echinocystis lobata*, is used for quick screening. Its leaves are interestingly lobed, and the vine covers unsightly surfaces very fast, once started. Somewhat similar is the canary-bird flower, *Tropaeolum peregrinum*, really a close relative of nasturtium. Both may self-seed.

Gardeners who like to try some unusual plants will find the following list of annual vines tempting:

Cardiospermum halicacabum, balloonvine or heartseed, with deeply-cut leaves.

Cobaea scandens, cathedral bells or cup-and-saucer vine, a tender plant.

Quamoclit pennata, cypress vine, showy scarlet flowers.

Eccremocarpus scaber, glory-flower, with orange-red flowers an inch long.

The following two are propagated by bulbs or tubers:

Boussingaultia baselloides, a white madeira vine or mignonette vine.

Dioscorea batatas, cinnamon vine, a hardy vine of light growth.

PERENNIAL VINES

These have the same disadvantage as annual vines, i.e., bareness in win-

ter. The following four are often grown:

Lathyrus latifolius, everlasting pea, less beautiful than sweetpea.

Humulus lupulus, native hopvine, very hardy, will climb to 15 feet.

Pueraria thunbergiana, the amazing kudzu-vine, which may grow up to 40 to 60 feet each summer, a rank-growing climber with purple bloom.

Convolvulus japonicus, California rose, is not a rose at all, but a morning glory. However, you wouldn't recognize it as such; it is a delicate climber with double pinkish blossoms.

It is interesting to watch vines grow, to see how they twine, clockwise or counter-clockwise, and to watch them hoist themselves up by tendrils or thorns or cling by sucking-cups or roots.

This, then, is the story of the vines that we *do* need.



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Building and Maintaining a **GOOD LAWN *in* COLORADO**

GEORGE W. KELLY

This is the second of a series of articles on lawns, prepared by members of the Swingle Study Groups. It deals with seeding and kinds of seed.

The first of this series of articles, dealing with preparation of the soil, appeared in the April issue of THE GREEN THUMB. Following articles, dealing with lawn care, control of weeds, insect pests, and diseases, and lawn repair will appear in later issues of this magazine.

SEEDING THE LAWN

NOW, AND ONLY NOW, are you ready for the actual seeding. If the ground has been pre-watered or has lain for some time, a finish raking should be given. Then you are ready for the seed. This can be applied with various forms of seeders, although the best is probably the "cyclone" type which spreads widely rather than in a definite strip. If the seed is to be uniformly distributed, it must be applied when there is little wind. It is more fun to seed by hand, but few people trust themselves to do this (or they don't like to bend their backs). Whichever method is used, many good gardeners think that greater accuracy is assured if half of the seed is applied in one direction and half in the opposite direction.

After the seed is in, unless the surface is quite coarse, it would be well to run over the area with just the weight of the rake to slightly mix the seed with the soil. It should not be covered deeply. Many find that it helps to cover the seed with $\frac{1}{4}$ inch of peat to prevent unnecessary surface washing and baking.

The practice has been for many years to give the newly seeded lawn a final light rolling. This does make it look good but it is not necessary to press the seed into the soil as that is accomplished with the first watering, and rolling often leaves so smooth a surface that the first watering runs off too rapidly. If the soil has been properly prepared previously, rolling will not really be necessary. Some lawn men use a light "rippled" roller which gives the advantages of evening up the surface, yet leaves small, uniform depressions which help to prevent the water from running off too readily.

Immediately after seeding, the ground should be thoroughly watered. If the soil has been pre-watered this will be a simple procedure, but if the soil is quite dry it will take some time. Many good gardeners like to give this first watering by hand. One very satisfactory method is to lay out a system of plastic sprinkler hoses in a grid pattern to cover all the areas and control these at the petcock so that it will not be necessary to walk on the new lawn. Once the surface soil is settled various kinds of sprinklers may be used if they do not deliver large amounts of water in a small space so that it runs off before the ground is deeply soaked.

Future watering must be done to keep the surface of the soil moist until the grass sprouts are through the soil. This is the only time in the life of the lawn that the surface moisture is considered. After the lawn is up, which may be one

week or two, depending on the season and seed, taper off quickly in the frequency of watering until within a month of seeding you are not watering more than once a week (with occasionally exceptions such as lawn in very sandy soil or during very hot weather).

Sometimes burlap is used to cover a steep bank to avoid washing until the grass is up. This is often not successful, for it is difficult to remove the burlap at just the right time so that it does not uproot some of the grass. There are various types of "erosion-net" which are now available. These are designed to restrict erosion but to let the grass come through freely and disintegrate when their purpose is fulfilled. It is much better to water carefully by hand or with the proper sprinkler and give a little extra care. This is another benefit from pre-watering, for the soil treated in that way is less likely to wash.

Bluegrass may be seeded when the ground is warm in early spring, usually through April, May, and June, or with greater care in "watering-up" it may be seeded through July. Fall seeding is even better, as the weather gradually becomes more favorable with the passing of each week and the weeds are not so great a problem. Soil may be prepared in August and lawns seeded throughout September and to the middle of October. Later seeding is often risky.

In very steep places or where a quick effect is wanted, sodding may be done. This at least doubles the cost of the lawn, and good sod may be hard to obtain. If good sod is cut at a uniform thickness, handled promptly, and laid on a good soil bed prepared as for seeding, there can be the effect of an established lawn within a few weeks. If the cracks between the strips of sod are filled with loose soil or peat, and the new sod is properly tamped and watered in, this sodding is effectively done.

KINDS OF SEED

KENTUCKY BLUEGRASS. Common Kentucky bluegrass is a hardy, long-lived, sod-forming grass that spreads from underground root stocks. It is one of the most widely used lawn grasses in the United States. It is a basic lawn grass in cool, humid regions and in cool, dry regions where adequate irrigation water is available. Common Kentucky Bluegrass will not withstand poor drainage or high acidity. It grows best in heavy, well-drained soil of good fertility. In soil of low fertility liberal application of nitrogen, phosphorus, and potash are needed. Bluegrass is highly drought resistant; it has the ability to go into semi-dormant conditions during hot, summer months. It may be seeded at the rate of 3 or 4 pounds to 1,000 square feet. It is injured if mowed shorter than 1½ inches.

MERION KENTUCKY BLUEGRASS. This has proved superior to common Kentucky bluegrass in many regions. It seems to be less susceptible to some diseases and can be cut more closely. It appears to be more heat and drought tolerant and is very resistant to weed invasion. It is more susceptible to rust and needs more frequent fertilizing (especially with nitrogen) than the common Kentucky bluegrass.

RED AND CHEWINGS FESCUE. These rate next to Kentucky bluegrass as the most popular lawn grasses. Red fescue spreads by underground root stocks; Chewings fescue is a bunch-type grass. Both are established by seeding

and are used extensively in lawn mixtures. They grow in shaded areas and can stand high acidity. Good drainage is required but they will grow in poor, dry soils. Both of these are fine-textured and have bristle-like leaves that stand upright. When seeded heavily they form a dense sod that resists wear, but when injured by insects, disease, etc., they heal slowly. These grasses grow slowly and persistent low mowing may cause severe damage.

REDTOP. This is a short-lived perennial under lawn conditions and seldom lives more than two seasons when closely mowed. It is commonly used in lawn seed mixtures to provide a quick cover while more permanent grasses are developing. Heavy seeding helps to overcome its tendency to develop a coarse open-type turf. Redtop tolerates a wide range of soil and climatic conditions. It is drought resistant and has a low fertility requirement.

RYEGRASS. Italian or annual ryegrass and perennial ryegrass are propagated entirely by seed that is produced in the Pacific Northwest. Much of the ryegrass used for lawns in the United States is a mixture of annual and perennial. When used in most lawn mixtures it is to give quick cover while slower-growing grasses are coming. Many commercial lawn seed mixtures contain too much ryegrass. The ryegrass competes with the permanent seedlings for moisture and nutrients. On sloping areas, it is advisable to include a small amount of ryegrass in the seed mixture to help prevent soil erosion. The use of perennial ryegrass in lawn seed mixtures often results in ragged-appearing lawns that are difficult to mow. Coarse clumps of ryegrass may persist in a lawn for many years.

WHITE DUTCH CLOVER. This is regarded by some gardeners as a desirable ground-cover plant in lawns, while by others it is thought of as a pest. Grass growing in proximity to white Dutch clover may be benefitted by the nitrogen fixing ability of the nodules on the clover roots. The plants often grow in patches of varying size, giving the lawn an uneven appearance. Some people object to the white flowers and to the bees that they attract.

MIXTURES. The foundation of most successful lawns in this area is Kentucky bluegrass; however, the average homeowner can have good results from a mixture of various good grass seeds. Even on a small plot there are often varying conditions of sun, shade, soil quality, and drainage where mixing of seeds will supply one kind that will thrive under any condition.

A mixture of two or three permanent lawn grasses such as Kentucky bluegrass and red fescue may be most desirable in many places. These permanent grasses should make up at least 80% of the mixture. The cheapest mixture on the market may give a quick growth of green but not a lasting lawn. Such mixture usually contains a high percentage of temporary or nurse grasses, such as redtop or ryegrass. A good mixture should have not more than 10% of these grasses.

For your protection it is necessary that you know how to evaluate a good lawn seed mixture. Kentucky bluegrass does best in open, sunny areas and needs good soil. This grass spreads underground by means of root-like stems, so that a few original plants can eventually take over the entire lawn. The parent stock, natural Kentucky bluegrass, is a good mainstay for most

home lawn mixtures. The addition of a few other selected varieties of bluegrass to a core of the natural is recommended. Varieties such as Merion, Park, and Newport in a blend will take care of varying conditions, which is the basic reason for a seed mixture.

Red fescue is an excellent companion for Kentucky bluegrass. It thrives in shade areas and will fill in on poor soils. It is not so good a sod former as bluegrass, but its growing habits are the same. Good varieties include Chewings fescue, Penn lawn, Illahee, and the Oregon grown parent stock, creeping red. A good general purpose mixture may be two parts bluegrass and one part red fescue. For shady areas the proportion should be reversed.

Ryegrass, redtop, and meadow fescue are the most commonly used temporary grasses. Because they germinate quickly and produce large seedlings, they are often included in mixtures to serve as nurse grasses. The theory is that they give a fast cover while the bluegrasses are being established. Temporary grasses do have their use — on steep banks; their quick start does help prevent erosion. Sown in late spring or summer they give a quick lawn to enjoy until a permanent one can be put in.


Although not a grass, white clover may be found in many lawn seed mixtures. Its use is a matter of personal preference. Clover remains greener than grasses during hot, dry weather and does supply nitrogen to the soil.

Tall fescue or Kentucky 31 fescue, orchard grass, and timothy are bunch grasses which have no place in a lawn.

The rate of seeding grass mixtures will depend on the kinds and proportion of grasses used. This might be from 3 to 6 pounds for every 1,000 square feet. (Many authorities are now recommending the treatment of lawn seed with certain chemicals before seeding to prevent some possible, damaging diseases.)


The best bet on getting a good lawn grass mixture is to buy from a reputable seed house or local garden shop. "If you don't know your merchandise, you should know your merchant."

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? ? ? ? ?
 ? ? ? ? ?
 ? Pete ?
 Ponders
 ? ? ? ? ?
 ? ? ? ? ?



Dear Pete,

We have 14,296 night crawlers in our front yard and the same number in the back yard. The ground is so irregular that we have trouble keeping our balance as we trudge across the lawn. Can you suggest a treatment that will exterminate the night crawlers

without exterminating our lovable day crawlers?

OFF BALANCE

Dear Off Balance,

Remedies include lead arsenate, calcium arsenate, chlordane, or dieldrin. In applying any of these materials you should withhold water from the area for three or four days, then water in the poisonous substance thoroughly so the worms will drink heartily to satisfy their thirst.

Considering safety of your day crawlers, Clara Wieder prefers the use of liquid chlordane. If you're a sportsman or hot-rod gardener, she slyly suggests giving the inundators a jolt with an electric rod — the same shock treatment fish managers use to rid streams of trash fish. You must pick up the night crawlers to destroy them before they regain consciousness. Mrs. Wieder also reports success with the all-purpose fertilizers, especially a Greely product which has chlordane for crawlers, 2,4-D for dandelions, dacthal for crabgrass and numerous lawn weeds, and iron, sulphur, and nitrogen for a lush greensward.

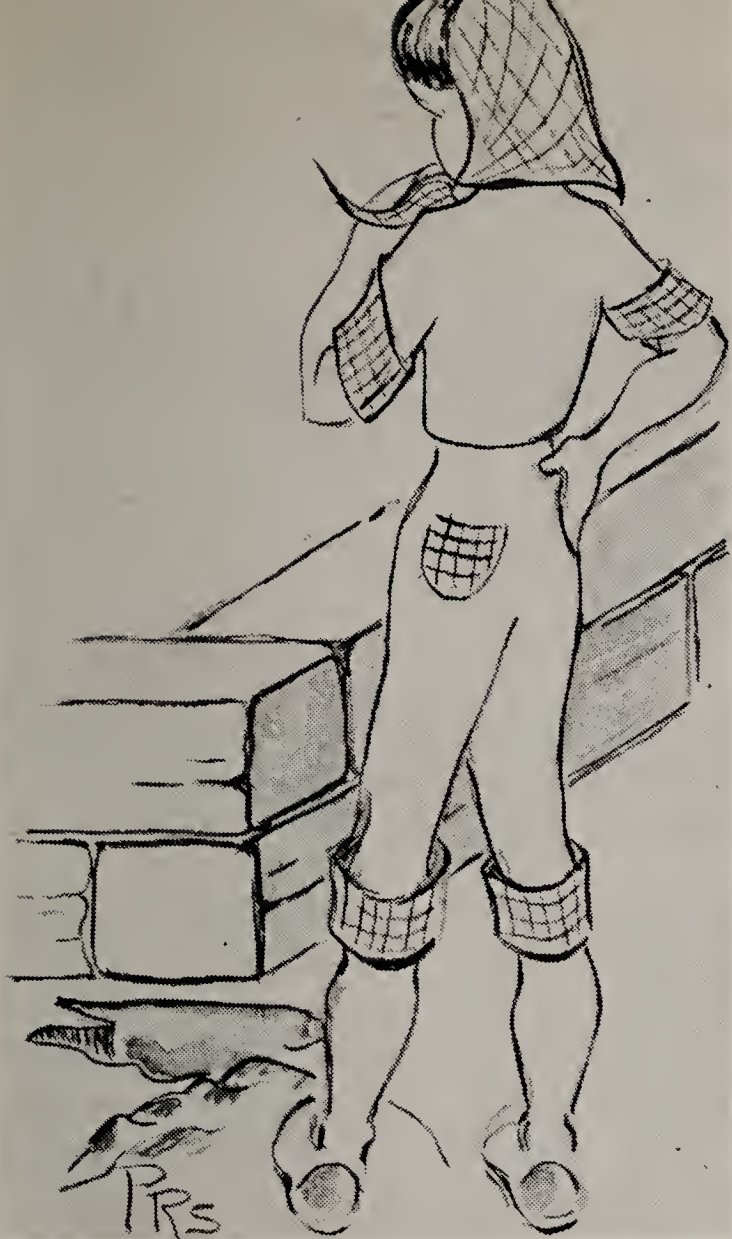
Dear Pete,

We'd like to partially hide our 30-inch retaining wall of rail ties with interesting shrubs or perennials. The plants will face south and west.

HIDE-A-WALL

Dear Hidwell,

Your rail ties suggest informality. If the heat is on the area try dwarf lead-plant, *Amorpha nana* or *A. fruticosa*, with grey foliage and spikes of purple flowers in June, or dwarf Siberian peashrub, *Caragana aurantiaca* and *C. pygmaea*, with fine green foliage and yellow-orange flowers. All withstand drouth but are subject to occasional attacks by blister beetles (easily con-



trolled with a stomach poison). *Yucca glauca*, *Y. baccata*, or *Y. filamentosa* and native rabbit brush are wonderful. The many species of rabbit brush display yellow heads of flowers in late summer. *Fallugia paradoxa*, Apache plume, which plumes and blooms all summer, is exciting.

If the heat is cozily warm try these potentillas: Golddrop, Snowflake, Katherine Dykes, and the new, double, white form (which will be available at the Botanic Gardens annual Plant Auction and Sale). These pest-free plants bloom throughout the summer. Barberries, blue-mist spirea, or Frikarti aster would be effective.

Dear Ponder-osa,

The tips of our ponderosa pines have shrivelled, and in examining the dried pulp I find a long worm hole. What goes?

IN-THE-TIPS

Dear In-The-Tips,

What has gone is pine tip moth larvae, they have bored through the tips

of your pines. Charlie Wilhelm, the younger, explains that it is difficult for the home gardener to tell if the moth will be active a particular year. Evidence is mainly from the preceding year and treatment is preventive. Chlordane, malathion, arsenate of lead, or a 1% solution of DDT — any stomach poison is effective if applied when the larvae emerge. DDT applied during the first two weeks of May would probably be easiest for the home gardener. If the larvae are not killed during this period the only alternative is to pick each infested tip individually and burn it.



Exotics of Colorado...

The REDBUD

DR. HELEN MARSH ZEINER

University of Denver

LUCKY IS THE PERSON who has seen the beautiful rose-lavender haze of a hillside covered with redbud in full bloom, with here and there a white cloud of flowering dogwood breaking the rosy expanse.

The natural range of the redbud, *Cercis canadensis*, is from New York and New Jersey west to southern Ontario, through Michigan to Iowa, south to the Gulf states, and westward to Texas. It reaches its peak of abundance and perfection in the southern half of its range, and perhaps is no more beautiful anywhere than in the hills of southern Indiana, where it is frequent in wooded ravines or on slopes, often covering large areas. Beautiful as the redbud is when flowering, it is classed as a weed tree and is grubbed out to make way for more useful species. Its only economic importance is as an ornamental.

Redbud is a member of Leguminosae, the pea family. It is a small tree, with dark red-brown bark. The leaves are large, dark green, and heart-shaped. The flowers occur in small lusters of 4 to 8, usually before the leaves appear. They are pea-like and rosy-purple in color. The fruit is a typical legume pod. In Denver, the blooms are usually seen in May.

Cercis canadensis is usually known as the redbud, but it is also referred to as the Judas trees, more-so in literature than in actual usage. In one local area in Indiana it is called the "fish blossom" because the larger fish spawn when the redbud is in bloom.

Where they are protected, a few redbuds are being grown successfully in the Denver area. In nature, they will endure shade, but grow best in partial shade or in the open. In Denver, they appear to be most successful where they have winter shade. The east side of a building or between buildings seem to be suitable locations. Possibly redbuds could be used as accent trees in front of sheltering evergreens.

Redbuds are best transplanted when very young. Even in their natural range, older trees are difficult to transplant successfully. They prefer a rich moist soil, with good drainage. However, winterkill rather than soil appears to be the greatest difficulty in this region. Greater care in the choice of a location should overcome some of this difficulty and permit the use of more redbud trees.

For those who do not know the redbud, there is a large and very well-established redbud on the South High grounds, in the shelter of the building. It should be blooming in May, probably early in the month, and can be recognized by the rose-lavender, pea-like flowers.

Your Landscape Picture

KATHERINE B. CRISP

Naturalist

THIS YEAR MAKE some new selections that will add interest to your garden. Choose woody plants that are different and have been tested for this area.

At the PLANT AUCTION AND SALE on May 25 and 26 in the Mall at Cherry Creek Shopping Center there will be more than twenty varieties to choose from. Here are some of them:

BARBERRIES — The barberry is used more for hedges than any other shrub.

CRIMSON PYGMY BARBERRY, *Berberis thunbergi atropurpurea*, has red foliage all season and scarlet berries all winter. For the best color grow it in full exposure to the sun. It may be used for low hedges (to 18 inches), edgings, and specimens.

WINTERGREEN BARBERRY, *B. julianae*, is an erect, branched shrub with dense leathery foliage and yellow flowers. A protected and partly shaded planting site is essential.

WARTY BARBERRY, *B. verruculosa*, is an evergreen which has leaves dark green with white undersurfaces. It is a spreading bush four feet high with violet-black fruit.

BUTTERFLY BUSH —

FOUNTAIN BUTTERFLY BUSH, *Buddleia alternifolia*, is a graceful, arching, branched bush (to eight feet) with willowy foliage. In early June it has very fragrant lilac-purple flowers along stems of last year's wood. Given a sunny location and little moisture it may be used as a specimen plant or in a border.

TRUE LAVENDER —

Lavandula officinalis has fragrant flowers and foliage. This plant is useful for sheltered sites.

BOXWOOD —

KOREAN LITTLELEAF BOXWOOD, *Buxus microphylla koreana*, is a compact shrub with small evergreen leaves which turn brownish in winter. This is an ideal hedge or accent plant for northern or eastern exposures and also for specimens in tubs on the porch or the terrace. It requires winter shade.

AUTUMN ELAEAGNUS —

Elaeagnus umbellata is a spreading shrub to 10 feet high with young foliage silvery and old leaves bluish gray. It produces abundant small berries which are silvery when young and change to red at maturity.

COTONEASTERS — The cotoneasters are picturesque shrubs with an inter-

esting branch structure or silhouette and bright-colored berries. They thrive in shade or full sun.

EARLY COTONEASTER, *Cotoneaster adpressa praecox*, has almost prostrate branches, small dark green rounded leaves, small pinkish flowers, and showy red fruits in autumn. It can be used as a specimen, a ground-cover (in the sun), or in shrubbery borders.

SLENDER COTONEASTER, *C. divaricata*, is a much-branched, graceful shrub (to five feet). Its foliage is highly polished dark green; its flowers are pink. There are brilliant, small, egg-shaped, red fruits in autumn. This shrub is well suited for hedges of medium height (three-five feet) and is an excellent border plant.

BRIGHTBEAD, *C. glaucophylla*, has leaves which are blue-gray on the undersides, scented flowers, and berries that are bright orange-red. It ranks among the best for berried beauty.

ROCKSPRAY, *C. horizontalis*, is a low trailing shrub four feet in height. Its leaves are small, half evergreen or drooping, and nearly round; its flowers are pinkish. Its foliage turns crimson in the fall. The chief charm of rockspray is its abundance of bright red berries in September. This shrub can be used as a specimen or in a shrubbery border.

EUROPEAN COTONEASTER, *C. integerrima*, is an upright, roundish bush with bluish green foliage, due to hairy leaf surfaces, which is a fine contrast with the bright red berries. Its flowers are pinkish and are arranged in nodding clusters (two-four flowers).

MANY-FLOWERED COTONEASTER, *C. multiflora calocarpa*, is an upright shrub with arched, spreading, whip-like branches and soft blue-green foliage. Clusters of white hawthorn-like flowers are produced in late May. In autumn crimson berries fringe the branches into October or November. This shrub may be used as a specimen or in shrubbery borders. It is well adapted for hedges.

EUONYMUS — Euonymus varieties are hardy, easily grown, evergreen vines or shrubs.

PURPLELEAF WINTERCREEPER, *Euonymus fortunei vegetus coloratus*, is a neat, uniformly growing, procumbent variety which retains its dark foliage the year round. Leaves become dark deep purple above and paler beneath in autumn and winter. This shrub makes a good ground-cover for shade or part shade.

COMMON WINTERCREEPER, *E. fortunei radicans variegatus*, has leaves which are small and half white-half green and red berries. It is a low-growing vine for trimmed hedges and rock gardens.

E. nanus turkestanicus keeps its foliage all year and has narrow, lanceolate leaves and bright, orange-red fruits.

CINQUEFOIL —

Potentilla fruticosa 'Double White' is very new. This dense, fine-textured shrub which has double white flowers from mid-May into September may be used as a specimen or as a border plant.

MAHONIAS — The mahonias are handsome, low-growing, broad-leaved evergreens. They should be planted in sheltered positions or protected from

wind and sun in winter. They are used best in shrubbery borders or in foundation plantings.

LITTLELEAF MAHONIA, *Mahonia bealei*, with its bold, compound leaves in striking horizontal position has a tailored appearance. Its flowers are pale yellow; its blue-black berries are covered with bloom. This shrub is best used for sheltered locations.

CREEPING HOLLYGRAPE OR CREEPING MAHONIA, *M. repens*, is a Colorado native, dwarf shrub with underground stems. Its leaflets are leathery with spiny marginal teeth. Its yellow flowers bloom in May and June. Blue berries are produced in grape-like clusters. Leaves turn red, dark purple, or yellow in the fall. This is a useful groundcover in rock gardens, between shrubs, on banks, or in foundation plantings along walls.

OTHER COLORADO NATIVES —

ROCKY MOUNTAIN MAPLE, *Acer glabrum*, is a several-stemmed shrub 6 to 12 feet tall. It has smooth gray bark and its young twigs and winter buds are bright red. It has typical maple leaves which turn pale yellow in autumn. Its open habit of branching, not useful for screening, is effective in a natural shrubbery border or as a specimen.

WATER BIRCH, *Betula fontinalis*, is a slender-stemmed shrub 4 to 12 feet high. Its twigs are covered with a glossy, reddish brown bark marked with lenticels of lighter color. It thrives in cultivation and appreciates plenty of water. This birch is most attractive when it is grown as a specimen so that its beautiful fountain form may be seen to best advantage.

APACHE PLUME, *Fallugia paradoxa*, belongs to the rose family. It is a low, erect, branched shrub. Its leaves are almost evergreen and it has white flowers and clusters of numerous feathery-tailed fruits. It is a useful and attractive shrub requiring sun and well-drained soil.

THIMBLEBERRY, *Rubus deliciosus*, is another member of the rose family. A symmetrical shrub 4 to 6 feet tall, in mid-May its thornless, arching branches become festooned with pure white, rose-like single flowers 1½ to 2 inches in diameter. Its berries are insipid but are relished by birds. This is the showiest shrub in the foothills and mountains in early summer. It should be grown in full sun.

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Guest Iris in **BOTANIC GARDENS**

EVERETT LONG

Long's Gardens,
Boulder, Colorado

GAY SPLASHES of color highlight the iris display in Botanic Gardens as a harvest of beauty rewards extensive plantings made last summer.

New this year is an assemblage of 687 varieties contributed by 155 hybridizers from all over the United States, Canada, England, Germany, and South Africa. This guest bed should have good bloom this year but will be at maximum performance next year when the Annual Meeting of the American Iris Society convenes in Denver. At that time from five to eight hundred members are expected to throng the gardens, checking and

re-checking the guest beds for the newest creations in Irisdom. So recently developed are many of these irises that they are not yet named, carrying only seedling numbers for identification. The intricate, time-consuming job of receiving, planting, and record keeping has been supervised and carried out by Mr. J. O. Riley, secretary of Region 20 (Colorado) group of the Iris Society.

Also new this year is a collection of over 100 iris species gathered on three expeditions in recent years by Dr. L. F. Randolph, president of the American Iris Society and world authority on



IRIS
'MILLIONAIRE'
at Denver
Botanic Gardens

origin and ancestry of iris. In this group, collected from central Europe, the Balkans, and eastern Mediterranean regions, are to be found the progenitors of today's modern iris blooming so beautifully in the guest beds and other plantings. Mrs. James J. Waring was instrumental in securing the Randolph collection for Botanic Gardens.

The several hundred tall bearded iris that bloomed so well last season have been re-planted and supplemented with many of the newest introductions. Dwarf, oncocyclus, regelia, and spuria varieties add their glamour to that of the tall bearded.

Denver Botanic Gardens has one of the five National Test Gardens of the American Iris Society. This year, for the first time, final judging will take place to evaluate performance throughout the country of plants submitted for testing. Code numbers are used for identification so that no subjective feelings will sway a judge's efforts to render critical, impartial scoring. Exceptionally meritorious varieties that grow well in all regions will be in line for the newly created All-America Iris award.

Supplementing the National program are Regional Test Gardens. Hybridizers from Region 20 AIS have placed their originations in Denver Botanic Gardens test plots to make them available for examination by the majority of qualified judges in this area. High recommendation by five or more



Iris lorteti, an *Oncocyclus* variety

judges qualifies a seedling for entry in the National Test Gardens.

The popular Botanic Gardens display bed of iris in City Park should again be a mecca for flower lovers. Completely re-done in 1960, even to new soil, the bloom stalks were removed last year before budding in order to encourage maximum plant growth for superior performance this year and next. Varieties include many fine regional developments and the best of top-notch national originations.

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MRS. JOHN SCOTT

WHEN WE SPEAK of perennials we usually mean the herbaceous kind. Hollyhocks, lupines, meadow rue, etc., are herbaceous or non-woody plants that die down to the ground each winter and resume growth in the spring. But trees and shrubs are perennials, too. Then, even more confusing, some perennials are grown as annuals in certain localities. Snapdragons or pansies, for example, can't be relied upon to overwinter here, so we treat them as annuals. Horticulturally, a perennial is defined as living, blooming, and seeding for three or more years.

But it's not so much what a perennial is, as what it can do that counts. Do you want perennials for landscaping your home grounds? If so, do you want these perennials for landscaping backgrounds or screens? Divisions or fences (hedges)? For public, service, or private area? Rockgardens? Pools? Ground-covers? Continuous bloom? Special colors — yellow, or perhaps, pink?

Or perhaps you're a flower arranger and want what is termed a cutting garden. You'll want perennials that will be long-lasting after being brought indoors, or, if winter bouquets are a must, that retain color and form when dried. Corsages are a popular home hobby using smaller, fragrant flowers.

Regardless of your wants, you'll prefer flowers that will grow or do well in your particular locality. Why struggle with a plant that can never be happy with an alkaline soil, for instance? Try lilacs which like limey conditions and have beautiful varieties to please the most discriminating gardener.

You, of course, don't have to grow all the hardy flowers. But unless you are on intimate terms with your soil, whether heavy and clayey or light and sandy, start with the easier-to-grow. They're the common plants everybody has. Again, if you're new to gardening, try those that make a big show with little know. The same applies if either your time or strength is limited.

Ever since Herb Gundell (Roundup section of the Sunday Denver Post) advised parents to get their children plants for pets (geraniums, I think it was), I've been conscious of plant personalities, or individual treatment for each plant type. Let's pamper these perennials by putting them in their preferred placement. Do they want sun or shade? Wet or dry feet? Large or small space? Back, middle, or front position (tall, medium, or low growers)?

And when should these perennials be planted? Spring, summer, or fall? Actually all these seasons depend upon the plant. Most of us do almost as much gardening in autumn as in the spring because September, October, and November may have nicer working weather. We not only set-out new perennials, but we divide, move, and give away, if we can, the established ones. (This is a disappointing surprise to many people who seem to think perennials connote permanency. The aggressive ones, such as Oriental poppies or fall asters have to

be constantly thinned. Phlox, chrysanthemums, or iris become lax bloomers if not divided every three or four years.)

Selectivity is the secret. Plan before planting. There's a perennial tailored to your taste. For more help I refer you to Dr. A. C. Hildreth's fine column "Down Your Garden Walk" published in the Rocky Mountain News and George W. Kelly's gardening bible *How to Have Good Gardens in the Sunshine States*.



Popular Perennials

for the Rocky Mountain Region

	Growth Requirement		Height			Season of Flower			Color					
	Sun	Shade	— 1 ft.	1 ft.-3 ft.	+ 3 ft.	Spring	Summer	Autumn	Pink	Blue	Red	Yellow	White	Various Colors
Aster	X			X			X	X						X
Bleedingheart		X		X		X	X		X					
Buttercup	X			X			X					X		
Chrysanthemum	X			X				X						X
Columbine		X		X		X				X			X	
Daylily		X		X			X							X
English primrose		X	X			X								X
Foxglove		X		X			X							X
Gaillardia	X			X			X	X	X		X			
Goldenrod	X				X		X	X				X		
Hollyhock	X				X		X	X						X
Iris	X		X	X		X								X
Lily	X			X			X							X
Lily-of-the-valley		X	X			X	X						X	
Lupine		X		X			X							X
Monkshood		X		X	X			X		X				
Oriental poppy	X			X		X	X							X
Painted daisy	X			X			X							X
Peony	X			X		X	X		X		X		X	
Phlox	X		X	X		X	X							X
Pinks	X		X			X	X		X		X		X	
Plantain lily		X		X			X			X			X	
Shasta daisy	X			X			X	X						X

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THE NAME GAME

M. WALTER PESMAN

Kinnikinnick, botanically speaking, is *Arctostaphylos uva-ursi*. Ursi — of the bear (see *Ursus major*) in Latin.

Arcto — for bear, since it lives in arctic regions (from Greek). Evidently kinnikinnick is bearberry, if you can trust botanists.

Staphylos — berry.

P.S. In the next issue look for various Latin designations to indicate low plants or dwarf plants.

Uva — berry or grape; uvate — a conserve made of grapes.

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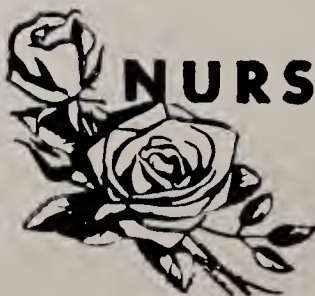
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TPHM

Reprinted from THE HORTICULTURAL NEWSLETTER,
Feb. 26, 1962, p. 49-50.

For the gardener indoors or out who must have something different, a new product has appeared on the market. Known as TPHM, or more edifyingly, Thorobred Perfumed Horse Manure, it is offered by J. H. Bennett Associates, 753 Bush St., San Francisco 2, in attractive polyethylene bags which contain 100 cubic inches of TPHM and which sell for \$1.00. Not only does the bag contain Thorobred Perfumed Horse Manure; it also contains details about uses. "Perfumed — of course, a breathtakingly fresh new experience for you

and your plants. Now, from the West's greatest race tracks, the Sport of Kings, comes a new dimension for the discriminating home owner. A product of elegance and persuasion, truly only a thorobred can produce such miracles of improvement for garden delight and plant happiness for you and your plants," so it says. It finishes, "When through using Thorobred Horse Manure, stand back, stop, look, smell, and admire your work." And we'll bet the sale will be active.

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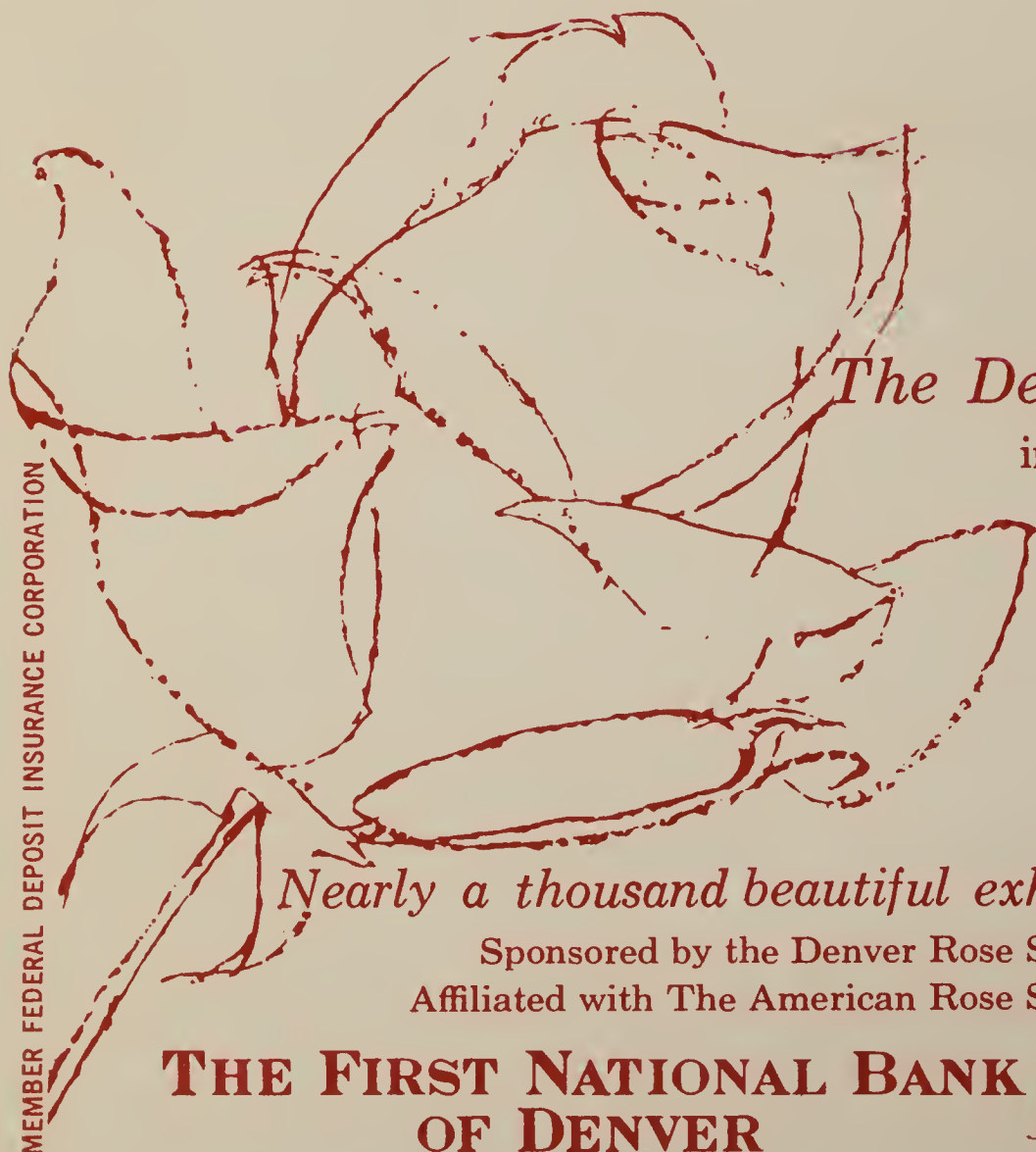
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Magazine for Rocky Mountain Gardeners

JUNE 1962

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THE COVER

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NOTES AND NOTICES

EDUCATION OUT-OF-DOORS — The University of Colorado, Denver Extension Center, will offer a course entitled "Colorado Wild Flowers" from June 20 to July 11. Instructor will be Mr. George W. Kelly. The course consists of field trips and lectures designed to increase your enjoyment from nature's wonders in the plant world as they are so well displayed in our state. These excursions, during the height of the wild flower season, cover floral and tree life from the plains surrounding Denver, through the foothills region, to the Alpine reaches of Mt. Evans. Field trips are scheduled for the afternoons of June 23 and July 7 and for all day Sunday, July 15.

"SHOW ME" CONSERVATION TOUR — DEDICATION OF BLUE STAR MEMORIAL PICNIC AREA — The Colorado Federation of Garden Clubs, Inc., announces a combination tour on June 22. Buses will leave the Continental Bus Terminal at 8:00 a.m., with a stop at Building 85, Denver Federal Center, at 8:30 a.m., and arrive at Blue Star Memorial Picnic Area, Winter Park, around 10:00 a.m. for dedication ceremonies. After a picnic lunch the tour will continue on to Fraser Experimental Station. The Forest Rangers have a very interesting conservation "show me" trip planned. Buses arrive back in Denver at approximately 5:00 p.m.

Reservations plus \$3.00 must be sent to Mrs. J. V. Carroll, 2070 Field, Lakewood, by June 15. No cancellations will be accepted or refunds made after that date.

IN COMMEMORATION OF KATHRYN O. KALMBACH — Friends of the late Mrs. Kathryn Kalmbach will meet at 7:30 p.m., Friday, June 29, at Botanic Gardens House, 909 York Street, Denver.

The program will consist of happy reflections on memories of particular significance involving Mrs. Kalmbach, by people who shared botanical interests with her. Slides in color taken by Dr. and Mrs. Kalmbach on their Caribbean tour last year will also be shown.

Contributions by groups or individuals for the furtherance of the Kathryn Kalmbach Herbarium at Botanic Gardens House will be accepted at that time. Those friends who cannot attend the commemoration may send their contributions to Denver Botanic Gardens.

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m. KLZ Radio.
The Green Thumb Program by Herbert Gundell, Denver County Agent

Every Saturday Afternoon — 4:30 p.m. KLZ-TV, Channel 7.
The Weekend Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE

JUNE

- 4th — Mon., 9:30 a.m., Denver Botanic Gardens Junior Committee
- 5th — Tues., 12:30 p.m., Mountain View Garden Club
- 6th — Wed., 7:30 p.m., Botany Club
- 7th — Thurs., 10:00 a.m., Colorado Federation of Garden Clubs State Board Meeting
7:45 p.m., Orchid Society
- 8th — Fri., 10:00 a.m., Friendly Gardeners Tour of Iris Garden
- 11th — Mon., 10:00 a.m., Judges' Council
2:00 p.m., THE GREEN THUMB Editorial Board Meeting
- 12th — Tues., 10:00 a.m., Herbarium Study Group

- 13th — Wed., 7:45 p.m., Landscape Contractors
- 14th — Thurs., 8:00 p.m., Rose Society
- 20th — Wed., 9:30 a.m., "Fun with Flowers" Workshop. Mrs. J. E. Tillotson, Speaker
- 24th — Sun., 2:00 p.m., Colorado Cactophiles
- 27th — Wed., 7:30 p.m., Landscape Contractors
- 28th — Thurs., 1:00 p.m., Ikebana International Flower Arranging Class
- 29th — Fri., 7:30 p.m., Kathryn O. Kalmbach Commemoration

JULY

- 2nd — Mon., 9:30 a.m., Denver Botanic Gardens Junior Committee
- 4th — Wed., 7:30 p.m., Botany Club
- 5th — Thurs., 7:45 p.m., Orchid Society



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Aa Bb Cc's of

PLANT BREEDING

DR. MORAS L. SHUBERT
University of Denver

This is the first of a series of articles on plant breeding by Dr. Shubert. More articles on this subject will appear in later issues of THE GREEN THUMB.

THAT TITLE is not the error of a stuttering typesetter! As we proceed through several elementary lessons in garden genetics for amateur plant-improvers, the significance of it will evolve. Our purpose will be to think about the basic principles that govern all of the inheritable traits of our garden plants—the same principles upon which all plant breeding is based. Lest you be afraid that this series of discussions is going to be too technical and “scientific,” I want to dispell such qualms right now. It is true that technologists in genetics have a highly specialized language, as do other specialists. Did you ever stop to think that an important requirement of any specialist, whether he be a doctor, lawyer, or merchant, is that he be able to communicate in the language of his special field? One of the purposes of this series of lessons is to translate into laymen’s terms much of the technical language of the science of genetics. A second purpose might be to define some of the more useful technical terms so that we amateurs can add them to our vocabulary. For the reason that we have “technical” words is that they precisely connote an idea, and usually any attempt to use synonyms results in slight deviations from the exact meaning.

It is my hope that the ideas which will be conveyed to you will give the fundamentals and the stimulation to do additional reading and to try plant improvement techniques in your own garden. If enough interest is shown, there is no reason why we can’t have a course on this subject at Bontanic Gardens House.

VARIATION IN PLANTS

Variation in genetically controlled traits is the basis for plant improvement, because if there were no variation there would be no opportunity for the development of better varieties. So we need to do some thinking about the kinds and degrees of variation from plant to plant in our own gardens. It is so obvious that it may seem ridiculous to mention the differences between a rose, a petunia, and a chrysanthemum, yet by taking such a contrast as a starter, we can see that these three examples are widely separated genetically. That is, they must be of three c o m p l e t e l y different “blood lines.” Actually, they are so distantly related that they not only belong to different families but even different taxonomic orders.

Next we might consider three more examples, a cherry tree, a peach tree, and a plum tree. None of us would have difficulty in telling them apart,

especially when they have ripe fruits, but they are related closely enough that we speak of them as the "stone fruits." So, while seeing their differences, we also note certain similarities. Therefore, it is not surprising to find that they are all members of the same genus, *Prunus*, but still are genetically enough unlike one another to be given three separate species names.

How much variation can there be within a single species? We are familiar with the great variety of form and flower color in the common garden perennial which we call chrysanthemum, so since nearly all varieties are variants of the single species, *Chrysanthemum morifolium*, we can observe such a tremendous degree of inherent variation that we begin to wonder just what a species is. The biologist has found it very hard to write a satisfactory definition of the word "species," but for our purposes we can use a simple practical definition. We can say that a species is a group of similar plants which are closely enough related to permit free inter-breeding with the production of a high proportion of viable seed. If we try to breed two different species, even when they are of the same genus, we get little viable seed, and the progeny from that seed are almost certain to be sterile.

Recognizing that there are variations in characteristics which we can see, is all such variation from plant to plant the result of genetic differences? Any gardener knows that the answer to the question is "No," because we commonly see variation in the size of individual plants and in the color and shape of their leaves and flowers which we know are caused by differences in soil conditions, the amount of sunlight received, or some other environmental condition. Hence, we must recognize that variation may be

dependent upon either, or both, of two controlling factors, one hereditary and the other environmental. I like to remember that the genetic factors, which are inherited, establish what the potentialities of the individual are and that the environment we provide determines to what degree those potentialities can be developed. Our best gardening techniques usually are aimed at developing genetic traits of their highest degree of expression. A notable exception is the growing of bonsai-dwarfed trees!

AMATEUR CONTRIBUTIONS TO PLANT IMPROVEMENT

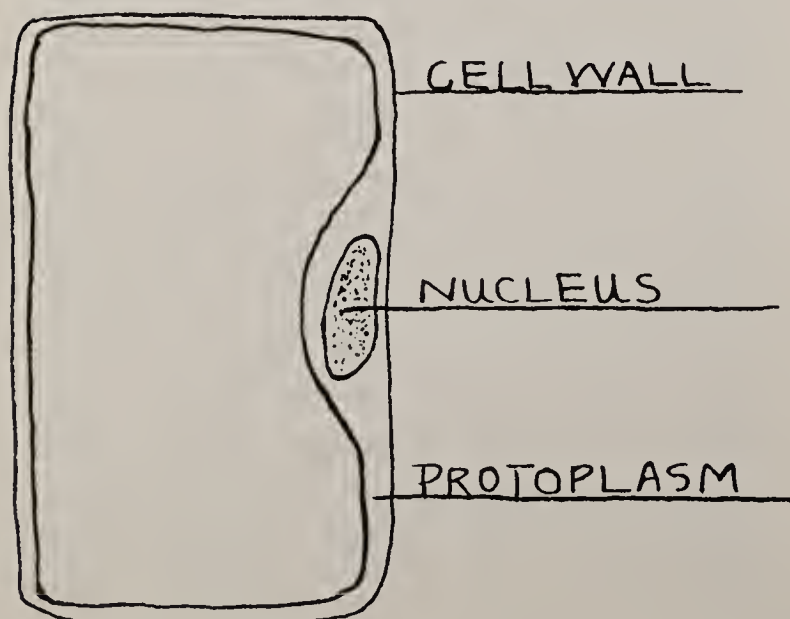
Did you ever stop to think about the unlimited potential for improving plants through the combined efforts of the thousands of home gardeners across the country? If gardeners would be more careful to observe and save the unusual and more desirable variants that show up from time to time, their efforts would make an enormous addition to our stock of domesticated varieties. And this is just one more place where the botanic gardens in various communities can serve in horticultural advancement. Whenever a new variant appears, experts at your nearest botanic gardens will be able to help in evaluating the importance of your discovery and in helping to propagate it.

This brings up another point, that while our topic is on "plant breedings" we must bear in mind that a lot of new varieties will be discovered that can be propagated vegetatively, by cuttings or grafts, without any actual breeding. Plant improvement has resulted from, and will continue to depend upon, the *selection* of the best variants, whether they be the result of accident or intentional hybridization. Much of the work in plant improve-

ment (probably most of it) has been done by gardeners who are essentially amateurs. Take irises and African violets as examples. Is it not safe to say that most of the named varieties in these two species have been introduced by amateur growers? With greater enlightenment, we might expect that many more species will be improved through the efforts of amateur plant breeders.

HOW TRAITS ARE CONTROLLED

If we are going to have a clear understanding of what happens when we cross two plant parents, we will need a basic knowledge of the factors which control all of the genetic traits of each individual. First, we must remind ourselves that each living organism is made up of units called cells, and that each cell is a bit of highly organized protoplasm. This protoplasm owes all of its living qualities to the fact that it maintains a continuing series of chemical reactions which involve the intake of simpler materials and the incorporation of these substances into cell parts. This requires a lot of energy, and such energy is supplied by the food materials which the cell acquires. The pertinent fact to consider is that all of this cell biochemistry is dependent upon a multitude of highly specialized protein molecules which are called enzymes.



These enzymes are so specific in the work that they do in regulating the happenings within a cell that we know that a red petunia, for example, has a slightly different set of enzymes than a white one, and that a purple-flowered one will have still other enzymes.

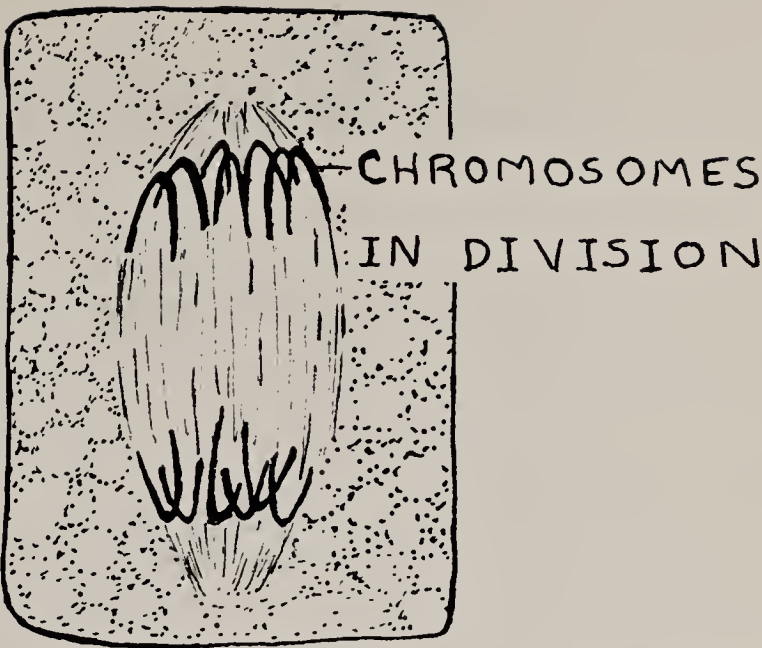
While we cannot look at a cell and tell what kinds of enzymes it contains, the specialists who study cell structure as related to the genetic traits (cytogeneticists) have learned that there is a direct relationship between genetic traits and the chromosomes that reside within the nucleus of each cell. The nucleus, a small body within the protoplasm which can easily be viewed under the microscope, contains the chromosomes, which at certain times are visible as thread-like particles. The number of chromosomes in every cell is the same and this number is fairly constant for all of the members of one species. For instance, if we look up the number of chromosomes for cherries, peaches, and plums, we find that they are 32 per cell, 16, and 16, respectively. We can see from this that the genetic traits are not determined by the chromosome number but that something else must be involved. To make a long, tedious (but extremely interesting) story short, the scientists have studied the correlation between chromosomes and genetic traits and have found that each chromosome contains many units along its length which are associated with the specific traits.

While the geneticist objects to the simile, it is still easier for us to visualize these units, spoken of as "genes" as though they were beads on a string. This gives us a picture in our mind's eye which is helpful in understanding these genes. Another idea that we need at this time is that in every cell of every leaf, stem, and root of the plant

the chromosomes are in pairs, and of course this requires that the genes contained on those chromosomes are also arranged in pairs. What this means is that normally any trait is regulated by at least one pair of genes which are present in every cell of the individual. (Please do not interrupt to ask what flower color genes are doing when they are in root cells, because we cannot answer that question!)

How do genes work? The commonly accepted idea at present is that each gene on each chromosome is able to take incoming molecular fragments from foods absorbed by the cell and make these, indirectly, over into the protein enzymes which we have already mentioned. The enzyme has the ability to control the kinds of products formed within the cell.

To carry our idea of gene control one step further, let us imagine a species of plant in which each of the many kinds of genes are in pairs where each member of the pair is identical with its mate. If this is true there will be absolutely no genetic variation within this hypothetical species. Every



member would be as much like every other one as identical twins are alike. In fact, the reason why identical twins are so much alike is that they have exactly the same sets of genes in their cells. Actually there could be no genetic improvement in a species which had no genetic variation, such as the one we have taken as our imaginary example here. We can see where our thoughts are heading! The members of each pair of genes (though they control the same general trait) do not have to be of identical composition. The very fact that they frequently are in pairs of two slightly different modifications gives us the genetic variation upon which all plant improvement is based. In our next consideration we shall pursue this idea further to learn something more about the origin of such gene variations.

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ANNUALS AND BEDDING PLANTS

What's in the Air!

JERRY LEGENDRE

Landscape Architect, Department of Parks and Recreation,
Denver, Colorado

LANDSCAPE ARCHITECTURE is probably the only fine art which offers satisfaction to all of the human senses, but do we take full advantage of this fact?

Painting and sculpture, probably the most familiar forms of art, are labeled "visual arts." Their greatest contribution is primarily to our sense of sight, secondly to that of touch. Music is totally satisfying to our sense of hearing.

Landscape architecture, through its employment of living materials and natural elements, contributes a satisfaction to another sense, lacking in the other art forms, one of which we often fail to be conscious, the sense of smell.

Because we cannot see odors nor touch them we often ignore their usage. Their possibilities are definitely most neglected. Fragrances are bountiful; they are everywhere — they are in the air. We have been conditioned by command to "look at," "listen to," and "feel" objects which satisfy particular senses; why don't we train ourselves to be conscious of the abundant pleasing odors to be found in our landscapes?

Even in the pleasant environment of a well-designed garden we tend to limit our participation to merely looking at the flowers. You have observed, on many different occasions, a person strolling through a garden. Won't he stoop to pick a rose or a carnation? Won't he, then, twist it between his

fingers to visually admire its form and color? Finally, won't he lift it to his nose, seemingly to enjoy its sweet fragrance? Has he expended his energy in "sniffing" through sheer pleasure of the rewards, or has he smelled the bloom because he knows that roses are supposed to be scented and simply wants to assure himself that they still are? Why doesn't he pick the bloom and examine it to confirm his suspicions that this delicate flower is the source of the rich sweetness which fills the air?

Our association of scents in the garden is too often limited to that of flowers, primarily those of annuals. Certainly their value must be recognized and exploited to the fullest. Without question, the sweetest smells are derived from annuals such as these names suggest: sweet pea, *Lathyrus* sp., and sweet sultan, *Centaurea* sp. These limitations to annuals, however, hamper the total enjoyment of our garden environment. Where else can we search for sources of fragrance?

Preceding the rains, a fresh wind whistles musically through the pines. Haven't you noticed the cleansing smell accompanying these sounds? It is discharged from the bruised pine needles. This same effect is available from many scented foliage plants and countless aromatic herbaceous plants. The pungent odor of lavender cotton (*Santolina*) and the penetrating odor of crushed mint (*Mentha*) are examples. Myrtle (*Myrtus*) bordering paths

where strolling people brush against it, releases the fragrance of its foliage which is highly pleasing.

Then, when the rains do come, we are aware first of all of a musty odor, then of the sweet smell of fresh water which exists along with the splattering sound of raindrops striking the pavement.

After the rain, when the humidity is high and the atmosphere is heavy, we spend the hours approaching evening relaxing on our terraces. The movement of air is slow and the aroma of our surroundings linger to delight us. This is the time during which we are most conscious of the fragrant potted plants which we have selected to enhance our patios. We can now appreciate the heady odors of the wistaria, gardenia, and jasmine as they thrive in their protected cultures.

As we retire for the night with our bedroom windows open to the fresh

mountain breezes, we can still enjoy wonderful fragrances in the form of night-blooming plants, such as tobacco (*Nicotiana*).

The potentials of odoriferous plant materials have been recognized and have been utilized in a very serious manner in Vienna's Wertheinstein Park and in other areas of the world in the development of "Gardens for the Blind." All necessary explanations and detailed descriptions are furnished in Braille script. The delight that the blind must experience in a garden of this type is undoubtedly most gratifying, not only to the blind, but also to the designers and maintenance staff who are capable of witnessing their enjoyment.

The design of odoriferous gardens is very delicate and is extremely vulnerable to personal variances. Some will prefer strong fragrances, some wild scents, and some (pity them) none.

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THE PLANTS INCLUDED under this name comprise an entire order, made up of several families. They include plants varying in size from creepers to large tree-like plants. Most of the larger ones are found in the tropical regions. Most of the ordinary native species, as well as most of those in cultivation, consists of an underground stem or rootstock with leaves, called fronds, clustered in dense crowns or of creeping stems.

The ordinary fern plant represents the asexual growth. (Asexual is reproduction by means of vegetative parts of a plant such as roots, shoots, or leaves.) Many ferns propagate vegetatively by runners or offsets, by bulblet-like buds, and in certain species by the tips of leaves bending over and taking root. Ferns frequently hybridize. The crossing takes place naturally by accidental mixing.

The general culture for growing ferns, for keeping them healthy and in good growing condition, and for preventing and killing insect pests and diseases is to carefully maintain a proper atmospheric condition at all times. Extremes in heat, moisture, or

dryness should never be allowed either indoors or outdoors; all ferns require about the same treatment. When grown outdoors they should be planted in shady areas; they do best where there is a lot of shade. Sometimes when the hot sun gets on them they will burn badly. So in this case you will not get your full value from ferns.

On warm, sunny days when air is admitted into a home much of the moisture is lost by the drying out of the air; during cold weather heat will dry out your ferns. So in any case your ferns would benefit by syringing them occasionally with clear water. Sometimes pests like red spider mites or thrips are troublesome.

A good soil for ferns is a good loam to which has been added equal parts of peat moss and well-rotted leafmold. If the soil is on the heavy side, sand can be added to make it more porous. When potting ferns be sure to provide good drainage in the bottom of your pots by using pieces of broken flower pots or coarse gravel. Firm the soil in the pot by using a piece of lath.

Ferns generally grow best when planted by themselves. The space be-

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tween the plants should not be mulched or given a ground cover of mosses or other plants which will hold the moisture more evenly on the soil surface and will allow the ferns to grow roots near or on the surface.

There are a few ferns, such as Boston, compact Boston, and maiden-hair, and asparagus, such as fern or Sprenger, which can be grown indoors. (Sprenger asparagus is good; it is used a lot for hanging baskets.) There are

several species of ferns than can be grown outdoors here. Our Colorado mole fern, if you can get it, is good. Ostrich ferns are good, but sometimes their tips burn during our late summer months. There are several others, but it is best to experiment with them and see how they will fare under our growing conditions. The fern family is large; more of these fine plants should be grown where a suitable place for them can be found.



Brief notes for the Flower Gardener

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FULL SUN FOR ANNUALS

Every year along about mid-summer questions begin to come in from gardeners about the failure of flowers to grow and bloom satisfactorily, and too many times the trouble can be traced to the location of the flower bed. Annual flowers and most perennials must have full sun, so right now, before it is too late, let's prevent this situation by planning to locate the flower bed or border on the south side of the house, or out in the yard well away from trees or shrubs.

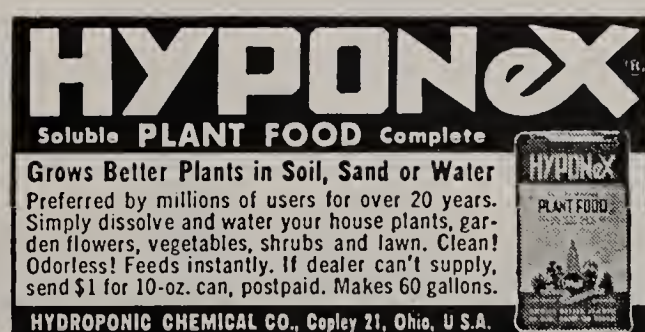
PINCHA DA COCOANUT

There's the old story about the vegetable stand proprietor who said, "No pincha tomato, lady. Pincha da cocoanut." This warning could well apply to flower seed packets, too. No pincha petunia, lady. Pincha da morning glory. Petunia seeds are more fragile than they seem, particularly when there

are relatively few seeds in a packet, as in the case of F-1 hybrids. If you squeeze the packet between your fingers to try to see how many there are you may well be cracking the seed coats in the process, with resulting loss in germination.

MIXING ANNUALS, BIENNIALS, AND PERENNIALS

A mixed border of annuals and perennials makes an ideal flower planting because it so greatly lengthens the blooming period. Just remember, though, that unless you buy large, started plants, biennials and perennials won't bloom until the second year.



STERLING BOWL TOURNAMENT

NOMINATED FOR the seventh annual Sterling Bowl Tournament, were the following women from Colorado:

Mrs. John S. Scott, 4550 S. Galapago, Englewood, Colorado;

Mrs. Budd A. Willetts, 5564 East Jefferson Avenue, Denver 22, Colorado;

Mrs. Vane E. Schierbaum, 1640 Hopkins Drive, Denver 29, Colorado.

In all, 110 names were submitted from 41 states. Out of these a total of 14 contestants will be selected for the

national competition which will be held this year, June 19-20, in the 17-acre Jackson & Perkins Display Rose Garden at Newark, New York.

Co-sponsored by the Jackson & Perkins Company and the Sterling Silver-smiths Guild of America, the contest features as first prize a \$5,000 perpetual challenge trophy. In addition, the top three contestants are awarded pieces of sterling silver and all contestants receive silver lapel flower containers plus all expenses incurred.

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FERTILIZER PROMOTES SHADE TREE BEAUTY

NATIONAL ARBORIST ASSOCIATION

AN APPLICATION of fertilizer will contribute more to the beauty and health of your shade trees than any other single treatment that can be given.

No tree is attractive unless it is healthy, and it cannot remain healthy unless the soil is rich in nitrogen, phosphorus, potash, and other raw plant food elements. To supply these elements abundantly is the purpose of using fertilizer.

When in vigorous health, a tree is almost immune to attack by wood-boring insects. Good health promotes quick recovery from injuries caused by sap-sucking and leaf-eating insects, some infectious diseases, and stem and root wounds. It has been demonstrated that trees in fertile soil are less severely affected by drought than those in poor soil.

The soil in a tree-and-lawn area can become so depleted of plant nutritional elements that tree health is impaired. As the raw food supply decreases over a period of several years, progressively the trees develop less foliage, individual leaves are smaller and yellowish in color, terminal twig growth shortens, and an increasing number of branches die.

You shouldn't wait for these symptoms of nutritional shortage to appear

before giving your shade trees fertilizer. It is easier and cheaper to keep a tree in good condition than to halt its decline and bring it back to health.

There is no definite rule as to how often or how much fertilizer should be used in tree treatment. As is indicated in a pamphlet prepared by the National Arborist Association, frequency of application and quantity of fertilizer needed varies with the soil condition, the species, age, size and health of the tree involved, and the type of fertilizer used.

Generally, an annual application is recommended. The fertilizer material should be high in nitrogen content; a 10-6-4 or similar formulation is advocated when dry fertilizer is used. This is applied at the rate of 3 to 5 lbs. per inch of trunk diameter for large trees, and about one-half that amount for trees less than six inches in trunk diameter.

Fertilizer applied on the soil surface, as is done in lawn treatment, is of little or no value to trees. For their benefit, the fertilizer must be distributed in the root zone some 10 to 15 inches below the surface of the soil. It may be applied by means of air or water pressure, or placed in holes drilled in the soil.

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In Appreciation

M. WALTER PESMAN

DURING THE RECENT Colorado Garden Show many of us were again keenly aware of the conscientious and quiet work that Kathryn Kalmbach always contributed to whatever she undertook. We all missed her. We still do.

At this time, however, the proper note is one of vivid appreciation for all that she accomplished and for the personality that was so distinctly vital and so distinctly her own. As few people do, she leaves with us an awareness of what even one person can accomplish who is thoroughly aware of many needs and is able to do something about those needs. The fact is that it would take a number of people to point out all of her accomplishments; they were varied and all worthwhile. More than that, her entire life was an interesting one.

Who would spend a honeymoon on a 150-mile canoe trip on a Michigan river taking in the natural wildlife in such a novel way? The newly-wed Kalmbachs did in 1908. It must have been thoroughly delightful, and it was one of the many ways in which the E. R. Kalmbachs were able to realize their joint interests.

In Washington, D. C., where they lived for 20 years, she was active all through her children's school years in the Parent-Teacher Association. She served as Publicity Secretary for the National Congress of Parents and Teachers for several years before moving to Denver.

Among other organizational activ-



Kathryn Kalmbach

ities, she was past president of the Home Garden Club ("The club that really did things," we often said of it.) and a charter member of Around the Seasons Garden Club. As a member of the Boulder Garden Club, she was active in the Colorado Federation of Garden Clubs, as well. Among her special interests were herbs and miniature roses. (In later years her botanical interest was broadened by her extensive trips to other countries, during which she was intrigued by the new types of plants in tropical regions.)

Nature appreciation was always an outstanding characteristic in her life. She often taught groups of boys and

girls the native birds and took them on nature hikes. Some of us have had the pleasurable experience of going camping in her company, either on Colorado Mountain Club outings or on botanical collecting trips. (The Colorado Mountain Club was ever close to her heart and she could always be found among the plant lovers' section. Climbing was as natural to her as walking; camping out was an intrinsic part of the fun.)

On one of the botanical collecting trips I remember particularly the careful work she did for Dr. Aven Nelson at Crater Lake. We had to hike ten miles up from Monarch Lake and found a rich collecting ground. There was nothing dull or stilted about it. Can't you imagine our live education in singing "*E-rig, E-rig, Erig-eron*" three times, and winding up with "*sal-suginosus*"? (How could we know then that later taxonomists would change the scientific name of this beautiful, large, lavender, subalpine daisy to *Erigeron peregrinus*?)

Can we separate her horticultural interest from her botanical specialty or from her knowledge of birds, in which she again shared her husband's learning? Garden clubs and the Colorado Forestry and Horticulture Association all profited from her executive ability and her writing, talking, and educating abilities.

It is difficult to tell just when her intense interest in herbariums started. It was certainly most appropriate to have the rapidly growing Botanic Gardens herbarium named after Kathryn Kalmbach. In the personal work she did on it she was aided by all of the local botanists. Joseph Ewan and Dr. William A. Weber were particularly close to her work, not to mention Mrs. Ruth Ashton Nelson and all the others. Supplementing these personal sources of botanical knowledge was a substan-

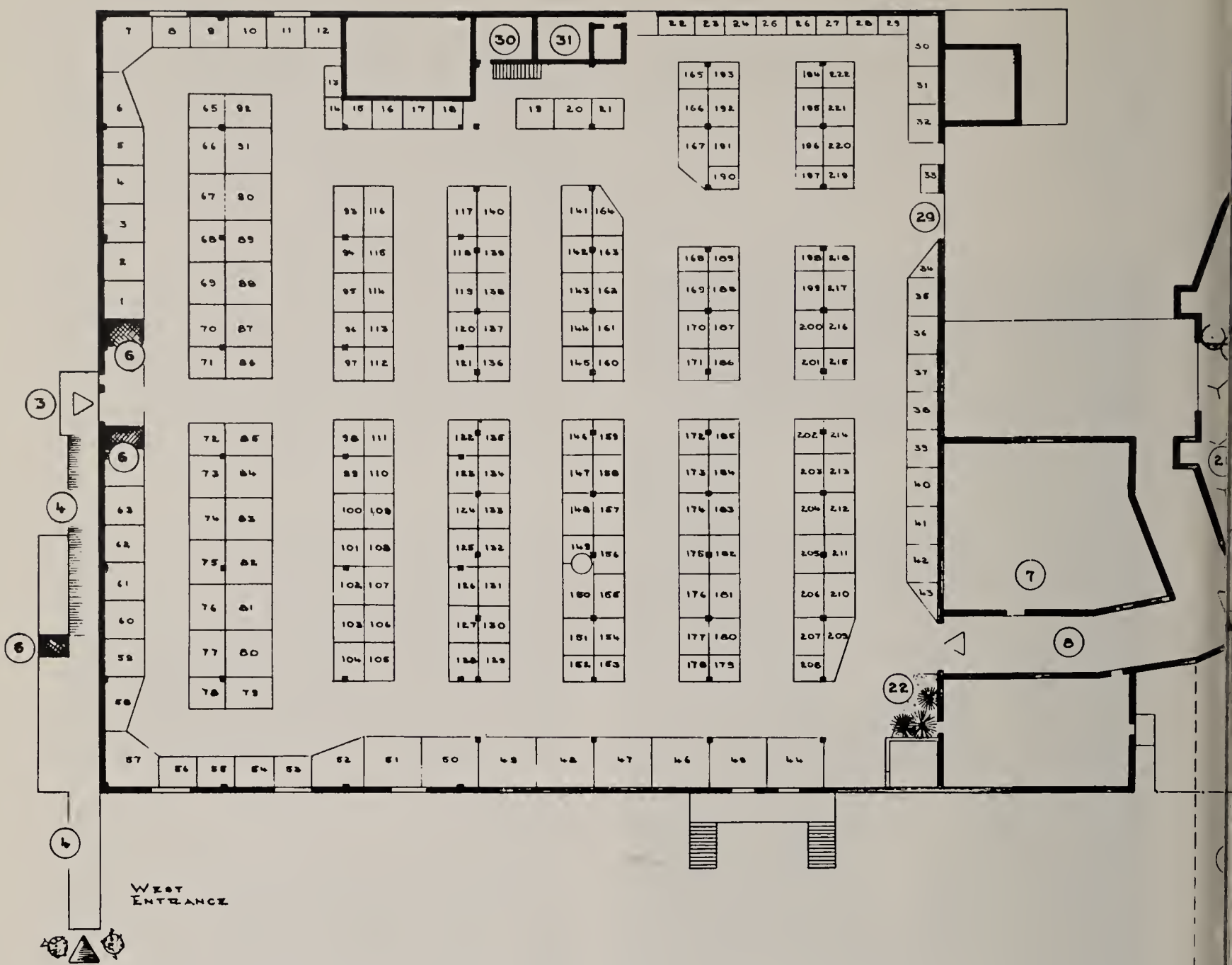
tial library devoted to gardening, horticulture, and technical botany which she accumulated through the years.

Joe Ewan's Seminar in Denver which she fostered was possibly the immediate specific boost for the herbarium at Botanic Gardens House. (See her article entitled "Hortus Siccus," *THE GREEN THUMB*, Vol. 17, No. 9, p. 314.) This Colorado Seminar in Botany was founded Jan. 7, 1941, and lasted until Ewan's leaving in 1945. President was Harold D. Robert; Secretary-Treasurer, Kathryn Kalmbach; Editor of the Seminar's organ, Mrs. C. Earl Davis.

And still we have failed to touch upon another definite angle of her many interests. She was an ardent philatelist, specializing in postage stamps of the world depicting plants. Her collection was quite complete and highly interesting to even non-philatelists. Perhaps it was indicative of her combined love of plants, of beauty, and of stamps.

Undoubtedly the dominant interest of her life was her friends and family. One of her first nicknames that she rather relished was "Gramma." On many garden pilgrimages she was accompanied by her grandchildren, many of whom were early indoctrinated by her love of flowers and of gardens. They were the children of Mrs. J. Loren Adams, Olin Kalmbach, and Mrs. E. O. Cook, all of Denver.

But back of all these versatilities — horticulturist, botanist, philatelist, mountaineer, wife, and mother — looms up her vital and wholehearted personality, her enthusiasm, her good common sense, her intellectual honesty, her straightforward yet kind character, and her dependability — all the sterling qualities that we value so highly and that were embodied in Kathryn Kalmbach. That is why we called this article IN APPRECIATION.



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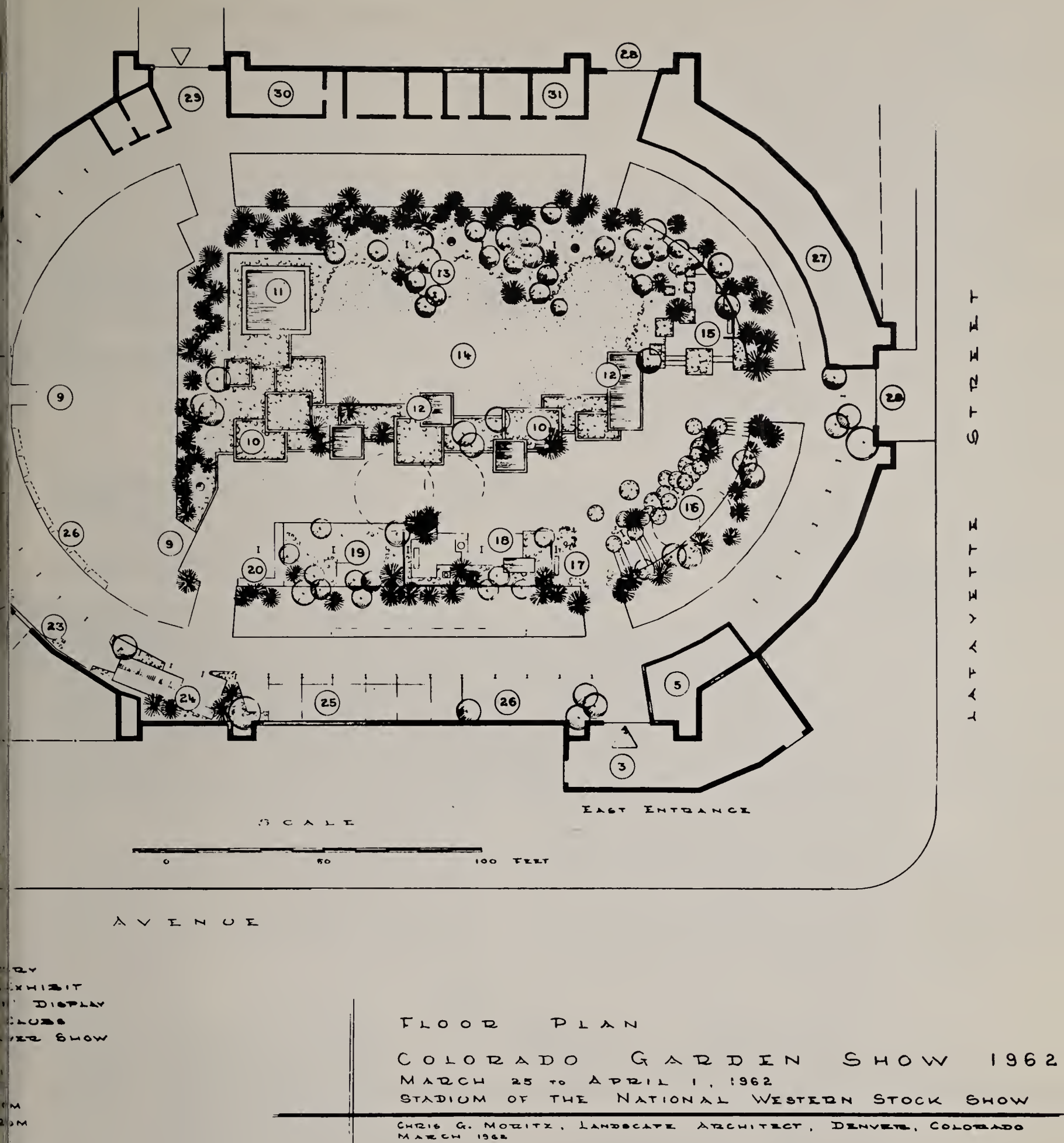
- | | | |
|---------------------------|---------------------------|---------------------|
| 1 TRAFFIC LIGHT | 12 FOUNTAIN | 22 DISPLAY OF TREES |
| 2 OVERTAKE | 13 NATURALISTIC PLANTING | 23 ARCHITECTURE |
| 3 ENTRANCE | 14 LAWN | 24 BOTANIC GARDEN |
| 4 ENTRANCE RAMP | 15 ROSE TERRACE | 25 MEN'S GARDEN |
| 5 TICKET OFFICE | 16 OVERLOOK | 26 COMPETITIVE |
| 6 TICKET BOOTH | 17 GARDEN COURT | 27 RESTAURANT |
| 7 GARDEN SHOW OFFICE | 18 CONTEMPORARY GARDEN | 28 EMERGENCY |
| 8 CONNECTING HALLWAY | 19 JAPANESE GARDEN | 29 TRUCK GATE |
| 9 GARDEN THEATER ENTRANCE | 20 BONSAI DISPLAY | 30 MEN'S REST |
| 10 MASS PLANTING OF BULBS | 21 REDWOOD ASSOC. EXHIBIT | 31 LADIES' REST |
| 11 FEATURE FOUNTAIN | | |

The 1962 Colorado Garden Show

RICHARD A. HAUGER
COLORADO GARDEN SHOW

THE 3RD ANNUAL Colorado Garden Show was held March 25-April 1, 1962, at the National Western Stadium and Exhibit Hall, E. 46th Ave. and Lafayette Street, Denver. General Manager of the Show was Lew Hammer.

Some of the features of the Show this year were these: a large formal garden



Garden Show Report

N, Sales Manager
N SHOW, INC.

scene with thousands of flowers in full bloom surrounding fountains, shrubs, and trees in full leaf; a display by the California Redwood Association entitled "Landscape Architecture Today"; the Competitive Flower Show; the Aquarium Display; and more than 100 displays for the garden, lawn, and house, including landscape



SCENE AT THE 1962 COLORADO GARDEN SHOW

Looking west across the lawn to the feature fountain in National Western Stadium

displays, mowers, patio covers, fencing, garden and lawn care, lighting, greenhouses, and many others.

A few of the special features of the Show which might be mentioned are these: the Garden Clinic programs, with Pat Gallavan hosting, drew fine crowds; three public school displays, from Thatcher, Fairview, and McMeen, were well received; the Aquarium Display presented by Colorado Aquarium Society was a big attraction; the annual Plant Sale of flowers and plants from the feature garden, which was held following the Show on Monday, April 2, attracted over 500 eager buyers; the total attendance at the 1962 Show was 55,135, a new record.

The Commercial Exhibit awards for the 1962 Colorado Garden Show were as follows:

1st Place — Belmont Electric/Public Service Co./Rite Lite

2nd Place — Marshall Nurseries

3rd Place — W. W. Wilmore Nurseries, Inc.

Honorable Mention (listed alphabetically) — Alcott Coal and Ice, Alscoa of Denver, Country Fair, Davis and Shaw, Dumont Sales Company, Green Bowers Nursery, and Mountain States Telephone and Telegraph Company.

The quality of all exhibits was excellent this year and the public gave many comments on this fact.

Thanks to all who had a part in making the 1962 Colorado Garden Show a success. This year's Show was truly "the region's finest garden, lawn, tree, shrub, and outdoor living exposition." Tentative dates for next year's Colorado Garden Show are March 23-31, 1963.

SCENE AT THE 1962 COLORADO GARDEN SHOW
In the southeast corner of National Western Stadium



WINNERS AT THE _____

Competitive Flower Show

MRS. JESS GIBSON, *Entries Chairman*

PEOPLE ARE interested in winners, be they horses, dogs, or flowers. This time it is flowers, flower arrangements to be specific. Right now, just after the 1962 Colorado Garden Show at Stockyards Stadium has closed, everyone is asking, "Who won?" at the Competitive Flower Show.

Here are the winners:

Class 1. FLORAL ART TODAY

Saturday, March 24

First — Mrs. George Hickey,
Englewood

Second — Mrs. F. C. Vetting, Arvada

Third — Mrs. Joseph Esterman, Denver

Tuesday, March 27

First — Mrs. Edmund Wallace, Denver

Second — Mrs. Esther Holtz, Boulder

Third — Mrs. Jess Gibson, Littleton

Friday, March 30

First — Mrs. Glenn Clayton, Englewood

Second — Mrs. E. F. Cramblit, Boulder

Third — Mrs. R. C. Wilson, Englewood

Class 2. SUDDENLY IT'S SPRING

Saturday, March 24

First — Mrs. Ann Brakke, Denver

Second — Mrs. Edwin Clinger,
Englewood

Third — Herbert Gundell, Denver

Tuesday, March 27

First — Mrs. Alice Williams, Denver

Second — Mrs. C. C. Hughey,
Littleton

Third — Mrs. C. Walter Allen, Denver

Friday, March 30

First — Mrs. Donald R. Moss,
Wheat Ridge

Second — Herbert Gundell, Denver

Third — Mrs. Francis Brown, Denver

Class 3. ASPIRATION

Saturday, March 24

First — Mrs. E. F. Hennessey, Denver

Second — Mrs. F. C. Konzal, Littleton

Third — Mrs. Vane Schierbaum, Denver

Tuesday, March 27

First — Mrs. Esther Holtz, Boulder

Second — Mrs. C. C. Hughey, Littleton

Third — Lee Ashley, Denver

Friday, March 30

First — Mrs. L. J. Woodman,
Englewood

Second — Mrs. G. A. Seastone,
Englewood

Third — Mrs. C. C. Hughey, Littleton

Class 4. SPLIT LEVEL

Saturday, March 24

First — Mrs. George Hickey,
Englewood

Second — Mrs. Vane Schierbaum,
Denver

Third — Mrs. Edwin Clinger,
Englewood

Tuesday, March 27

First — Mrs. F. S. Mattocks, Boulder

Second — Mrs. Raymond Evans,
Littleton

Third — Mrs. Willard Erickson, Boulder

Friday, March 30

First — Mrs. C. C. Hughey, Littleton

Second — Mrs. Glen A. Eloie,
Englewood

Third — Mrs. E. F. Hennessey, Denver

Class 5. MEN TO MATCH OUR MOUNTAINS (for men only)

Saturday, March 24

First — Lee Ashley, Denver

Second — Herbert Gundell, Denver

Third — Bill Stine, Littleton

Tuesday, March 27

First — Ted Williams, Morrison

Second — Lee Ashley, Denver

Third — George Kelly, Littleton

Friday, March 30

First — Lee Ashley, Denver

Second — George Kelly, Littleton

Third — Patrick Gallavan, Denver

Class 6. PLAQUES

Singles: First — Mrs. E. R. Edison,
Lakewood

Second — Mrs. Russell Myer, Denver

Third — Mrs. Francis Brown, Denver
 Pairs: First — Mrs. J. Russell Easton, Denver
 Second — Mrs. Glen E. Eloë, Englewood
 Third — Mrs. Francis Brown, Denver

Class 7. *CHIONODOXA*

First — Mrs. John Newman, Denver

Class 8. *CROCUS*

First — Mrs. Jess Gibson, Littleton
 Second — Herbert Gundell, Denver
 Mrs. O. C. Ewens, Denver
 Third — Mrs. F. O. Brown, Denver
 Mrs. H. B. Payne, Longmont

Class 9. *HELLEBORUS*

First — Mrs. Jess Gibson, Littleton
 Mrs. Fred Shortt, Boulder
 Second — Mrs. Pauline Steele, Denver

Class 10. *IRIS RETICULATA*

First — Mrs. J. V. Carroll, Arvada

Class 12. ANY OTHER SPRING BLOOM

First — Mrs. J. V. Petersen, Littleton,
 myrtle euphorbia
 Mrs. John Newman, Denver, violets
 Herbert Gundell, Denver, *Leucojum* sp.,
 snowflake

Mrs. F. O. Brown, Denver, tulips
 Mrs. H. B. Payne, Longmont, early
 violets

Second — Mrs. Willard Erickson,
 Boulder, daffodils
 Mrs. W. D. George, Boulder, tulips
 Third — Mrs. O. C. Ewens, Denver,
Scilla sp., squill

Mrs. H. B. Payne, Longmont, snowdrops

Class 13. FLOWERING SHRUBS

First — Patrick Gallavan, Denver,
 flowering plum and flowering box.

Class 14. DISH GARDENS

First — Mrs. Joseph Esterman, Denver
 Second — Mrs. E. R. Guild, Glenwood
 Springs
 Third — Craig Clinger, Englewood

Class 15. SMALL GARDEN DESIGN
 BY A CLUB

First — East Jefferson Men's Garden
 Club
 Second — Men's Garden Club of
 Englewood
 Third — Men's Garden Club of
 Wheat Ridge
 Fourth — University Park Men's
 Garden Club
 Fifth — Men's Garden Club of Denver

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Building and Maintaining a **GOOD LAWN *in* COLORADO**

GEORGE W. KELLY

This is the third of a series of articles dealing with lawns, prepared by members of the Swingle Study Groups. The first and second of this series dealt with the preparation of the soil, seeding, and kinds of seed; they appeared in the April and May issues of THE GREEN THUMB. The fourth and final article of this series, dealing with control of weeds, insect pests, and diseases and lawn repair, will appear in the next issue of this magazine.

THE CARE OF A NEW LAWN

AFTER THE SEED for a new lawn is in the ground, most of the final results depend on how the area is cared for. Watering it requires careful handling to be sure that the soil does not dry after the seeds are once wet and to prevent washing. After the seeds are thoroughly up it is important to gradually taper off on frequency of watering and to soak more thoroughly each time. It matters little if at this point the surface of the soil looks dry, if there is sufficient moisture down deep. By allowing the soil to dry as long as possible, the roots of the new grass plants are forced to go deep. With deep roots the lawn will withstand the hot days to come later, will crowd out weeds, will get adequate food and water, and will resist damage from the ever-present diseases.

After the first watering it is important to use only sprinklers that will throw water slowly enough that they may be left in one place for an hour, or even several hours if necessary, and not flood or allow run-off. A type of sprinkler that throws water in large drops and low-down will generally be more efficient because there will be less loss from evaporation on a hot day.

The temptation to roll out small irregularities in a new, soft lawn should be resisted. If the roller is heavy enough to roll out any bumps it will pack the soil so that it will cause much trouble later from compaction.

Very often in this area, when considerable organic matter has been used in preparing the soil, there will come a "five weeks slump" in the new grass, caused by a nitrogen shortage. This condition may be quickly remedied by the addition of a little nitrogen. It is caused by a peculiar chemical reaction where the decomposing organic matter in the soil temporarily "borrows" the nitrogen available in the soil. It makes little difference what form this added nitrogen is in. The straight nitrogen such as is in ammonium sulphate and urea will usually do as well as other forms and at a decided reduction in price. But these must be handled very carefully, for they may burn the grass if not applied uniformly or if they are not watered in immediately. They should not be applied when the grass is wet. Unless suitable spreaders are available it would be safer for the average homeowner to use the less concentrated materials which are not so likely to burn. One-fourth pound of actual nitrogen to each 1,000 square feet of lawn will usually be sufficient. With 21% ammonium sulphate this would be a little over a pound; 45% urea would figure a little over ½ pound; and a regular 6% complete fertilizer, about 4 pounds.

Weeds will appear with the grass in almost every lawn. Do not blame the

manure or poor seeds for all of them, for most of these seeds were probably in the soil to begin with. Usually it is a good practice to simply wait until these weeds are large enough to be mowed, rather than try to pull them all or to treat them with weed killers. They will usually do more good in protecting the new, young grass plants than harm by crowding. Most will disappear with the first severe frost, and the perennial types that survive the winter may be treated with appropriate weed killers when the grass is stronger in the spring.

As soon as the new lawn begins to show a solid green it is time to begin to edge it. Cut these definite edges in circles around trees and make smooth-flowing or straight lines around shrub borders, buildings, or drives. Do not leave a depression at these edges. If the soil is left level but bare about 6 inches along each edge, one wheel of the lawn mower may be run on this bare, level edge and most of the tedious trimming may be avoided.

Mowing should begin as soon as the average grass gets about 2 inches tall. Actually the weeds will usually require mowing before the grass is ready.

WATERING

The proper watering of an established lawn is probably the most important consideration in maintaining it in good condition. If we might make one general rule it would be "water less frequently and more thoroughly." Do not attempt to water on schedule, but only when needed. If there is any question as to whether or not a lawn needs water, get the habit of digging to see. After a while, when you become acquainted with soil, sprinklers, and all situations, you may be able to estimate the moisture in the soil by testing with a spike or screw driver. An efficient soil moisture tester may be made by attaching an old asparagus knife to a broom

handle, with the idea that all people are a little lazy and will actually do more testing if they do not have to bend their backs.

Some people would like to make rules as to the amount of water needed each week by a lawn, but this is a dangerous practice because there are so many variable conditions. What difference does it make how much water a lawn receives so long as the soil down deep is kept moist? It takes a little more thinking to practice simply "watering when the lawn needs it" and to "dig in and see" when it is not apparent that water is needed, but these practices will assure much better lawns.

Too frequent (and usually too shallow) watering is the cause of many of our worst lawn troubles. This practice will encourage shallow rooting so that the lawn may suffer in extremely hot weather. It is the chief cause of the condition which causes lawn diseases. It tends to compact the surface and to exclude the necessary air. It will encourage the formation of a mass of fine roots just under the surface of the soil which tend to obstruct the entrance of water, air, and fertilizer.

Sprinkler systems are a wonderful help in caring for a lawn if handled intelligently. Just because it is so easy to turn on the water, many people over-water or apply water by rules that do not allow for differences in soil, sun, season, or saturation. The automatic sprinklers that are set to turn on the water every morning for fifteen minutes or so may do much harm.

The important thing to consider is to keep the soil, down deep, moist. Do not let the appearance of the surface of the soil influence the frequency of watering. Watering by hand is usually just a way of killing time. Few have the patience to water thoroughly this way.

The type of sprinkler used may influence the way a lawn is watered. Those that throw a fine mist, that throw water high in the air, or that unevenly distribute water are a nuisance and can cause poor lawns. Those which throw water in a large circle, low and slow, are best. Often these efficient sprinklers are little more bother than an expensive underground system. The hose used should be of sufficient size. The cute, light, plastic hoses of small diameter so popular recently are not efficient. A good rubber hose of $\frac{5}{8}$ " diameter or larger is preferable.

The amount of water needed by a lawn and the frequency of watering will be affected by the type of soil, by the season of the year, by the slope of the land, by the velocity of the wind, and by the amount of sunshine that the area receives. The south sides of buildings and sunny places will require more water than open areas, and shady, north locations will require less. Heavy, clay soils will take longer to soak up sufficient water and will retain moisture longer than sandy soils. A steep slope will require more water than a level area. Most lawns will require more water in August than in April. Give each area only the water that it needs and no more. An average lawn may need about $1\frac{1}{4}$ inches of water per week. Other conditions may make it appropriate to use much less or more. Some think that a considerable amount of water can be saved by watering only immediately after mowing, arranging to cut at one time only such an area as can be watered immediately.

In our area we cannot put our hose away in October and leave it there until April. There are few winters that do not have open, dry periods where the plants, especially the lawns, need extra water to remain healthy. Remember that a plant should have moist soil

around its roots at all seasons and that our climate does not usually provide this. When it is dry down deep give it a soaking. Delay watering in the spring until the lawn shows it really needs it. This may be late May or early June.

FERTILIZING

If a lawn is planted in good soil which has been well prepared, it will not need continual fertilizing. All additional fertilizing will do to a lawn already growing well is to induce extra growth so that it will have to be mowed more often.

Actually, few lawns are planted in proper soil, so it is often necessary to give them additional food. The beauty of these lawns and their resistance to disease, drought, and weeds may depend on how well the deficiencies in available plant food are supplied by adding suitable fertilizer. To produce a thick, heavy turf one to three feedings a season are given Kentucky bluegrass, and more if Merion bluegrass is used. In general, frequent, light feedings are more effective than infrequent, heavy feedings. The thing most generally needed is additional nitrogen. This makes good green growth. The phosphorus in a complete fertilizer is often needed, but it is usually not available in any great quantity when applied on the surface. Potash, the third element in a complete fertilizer, is seldom needed at all in this region. Actually a pound of nitrogen will give just so much growth, whether from 45% urea, 21% ammonium sulphate, 6% complete fertilizer, or $\frac{1}{4}$ of 1% peat and sheep. The cost of this pound of fertilizer varies much, however, sometimes from as little as 18¢ to as high as \$2.00. You may easily figure what you are actually paying per pound by dividing the price paid per hundred with the actual pounds of nitrogen that it con-

tains. Some people still advocate the use of straight nitrogen but others maintain that the feeding of a complete fertilizer every three or four applications will give added results. Some of the newer complete fertilizers now contain up to 16% nitrogen; since that cuts down on the big cost of handling, they are cheaper for a given amount of fertilizer. Sewage sludge and fertilizers having sludge as a base actually contain little nourishment unless they are supplemented by additional chemicals; but, probably because of bacterial action not identifiable by a chemical analysis, they do much good in some special situations.

The use of organic fertilizers as a top dressing for all lawns is an obsolete practice by gardeners who realize that there is really little plant food contained in these materials. The place that they are really needed is in the ground before planting.

Some fertilizers made up especially for this area will contain a small percentage of iron sulphate. Most of our soils will benefit by the application of some iron sulphate. In some cases it is badly needed and there is little chance of its doing any harm. Dry iron sulphate may be applied at the rate of $\frac{1}{2}$ to 1 pound per 1,000 square feet. The spray application seems to be more quickly effective, as there is apparently immediate adsorption by the leaves. For spray applications, 4 ounces for 1,000 square feet seem to be enough.

There has been much discussion in recent years as to the proper time to apply fertilizers to established lawns. Some people advocate early and some late applications; still others figure that since the nitrogen, which is the most important element, leaches into the soil quickly, it is only practical to use fertilizers when the ground is warm and

the plant is growing. Between May 1 and September 1 is an old rule, but it is still used by many gardeners. Applications of a soluble fertilizer at a time when the plant cannot readily use it may allow the valuable nitrogen to leach through beyond the reach of the roots and may give little benefit, except to the manufacturer of the fertilizer. Some authorities maintain that the application of phosphate in October will encourage root growth and general health. It is quite generally agreed that over-fertilization in early spring with high nitrogen fertilizers may induce a too succulent growth which is subject to disease, so there is some tendency to fertilize in the fall even though some of the nitrogen may be wasted. We may find with more experimentation that some of the chemicals in a complete fertilizer are more efficiently applied at one season and other chemicals at some other time. Many homeowners would probably rather not figure this out. They will just pay a little more and will apply the same complete fertilizer whenever they think of it.

It is not easy to prescribe generally the amount needed for any lawn per 1,000 square feet, but some people use a rule that an average lawn may need 4 pounds of actual nitrogen each year, distributed over three or four applications. Each fertilizer manufacturer recommends the amount of his kind of fertilizer that should be used on each 1,000 square feet. This usually depends on the percentage of nitrogen that it contains, and the amount indicated is usually a maximum.

Combined weed-and-feed preparations are a lazy person's way of trying to save work. They are generally more expensive. If a lawn needs food, give it food; if the weeds need treatment, do that. This is a much safer way, for it

is too easy for some member of the family to accidentally use these mixtures on the rose bed with disastrous results.

In the last few years there has been an increasing use of the urea-form type of fertilizers, where nitrogen is so treated that it is released gradually throughout a whole season. These are, as yet, comparatively expensive but do save time on the labor of repeated applications. So far, they have given irregular results in our alkaline soils.

MOWING

In general, most lawns are mowed too closely for their best growth. One and one-half inches to 2 inches high would be better for most bluegrass lawns. Many lawn authorities believe that most of the lawn clippings should be caught and removed, but if the lawn is mowed frequently enough the clippings will usually disappear in the remaining grass. A general rule might be to cut not over $\frac{1}{4}$ or $\frac{1}{3}$ of the total blade at any one time. Closer cutting of bluegrass lawns encourages crabgrass, dandelions, and many other weeds. Merion bluegrass may safely be cut shorter ($1\frac{1}{4}$ to $1\frac{1}{2}$ inches). Because of Merion's denser growth, it is seldom advisable to leave any clippings. Coarser grasses, like wheat grasses, should be cut higher. Contrary to many assumptions, the clippings remaining on a lawn when a catcher is not used seldom accumulate to form the so-called "thatch." The condition that more often makes poor lawns is the mass of fine roots just under the surface (generally caused by too frequent, shallow watering) which

restrict the entry of water, air, and fertilizer into the soil. A term used by some to distinguish this condition is "mat." Unless a lawn is over-fertilized and the grass is allowed to get too long before mowing, the clippings will usually disintegrate before accumulating to any serious depth.

Most good lawn authorities recommend the use of a reel mower instead of a rotary mower. A reel mower usually makes a cleaner cut and a smoother looking lawn. With the increasing use of the high-speed power mowers, it is more than ever important to keep the blades sharp and well adjusted. Arranging for level, clear borders around all beds and edges will eliminate most of the back-breaking clipping of edges.

Raking of a lawn should be primarily to remove surface rubbish rather than to remove the mulch on the surface of the soil. Removing this mulch often just exposes the bare soil, so that it is easy for weeds and crabgrass to germinate. Lawns that have developed thick layers of "mat" under the surface may need radical treatment. Aerating will cut holes through this mat; there are a number of new machines designed to tear it up. It is a question whether some of these machines do more good than harm.



MEMBER

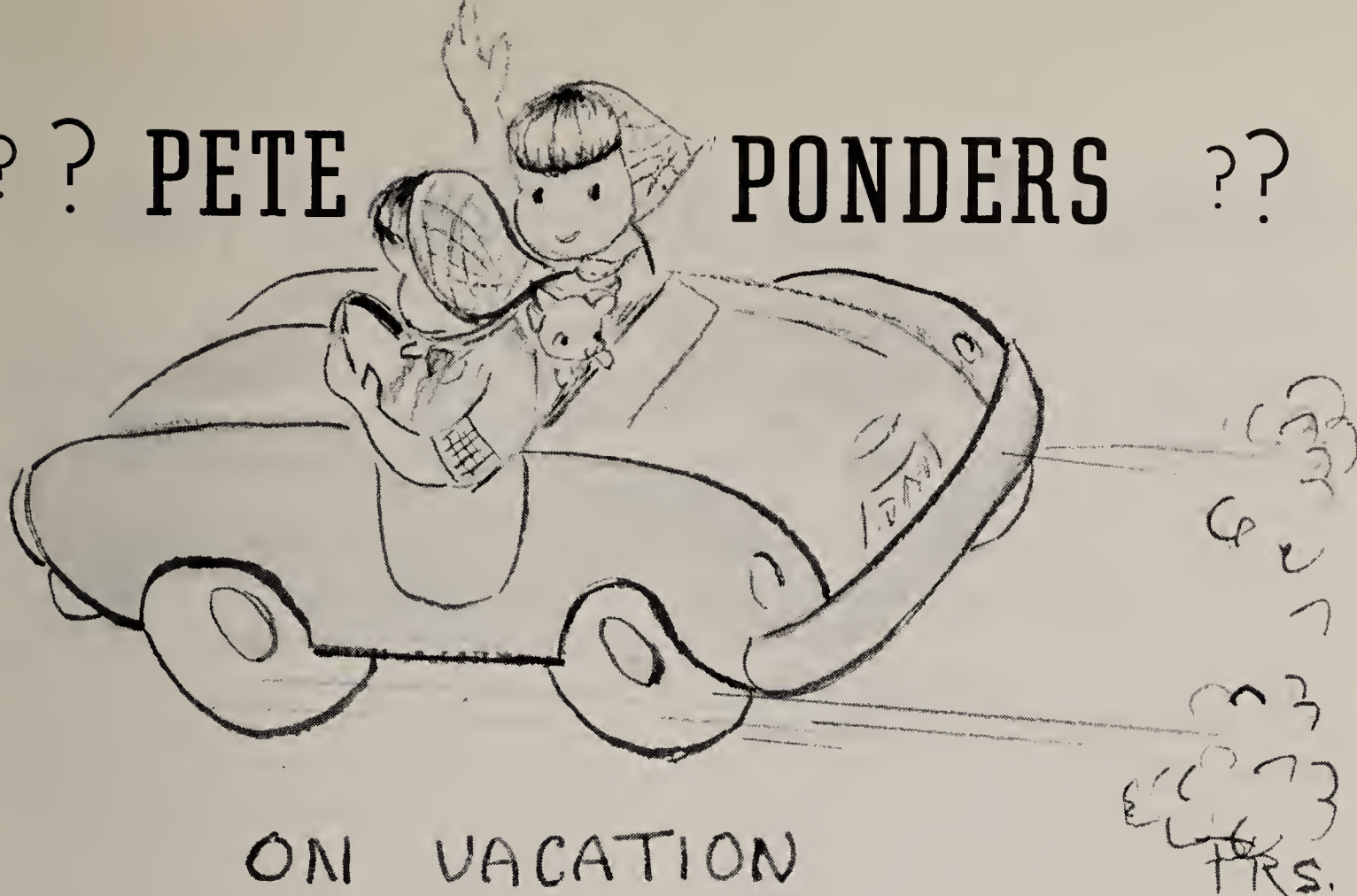


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?? PETE PONDERERS ??



ON VACATION

Dear Friendly Gardeners,

Wandering instead of pondering is the June schedule for my personal portraitist, Polly Steele, and me.

If you have an outdoor or indoor gardening problem, a question concerning native or cultivated plants, a help-

ful tip you'd like to share, please send it to me, Mrs. Pete, at 1550 Ridge Road, Littleton, Colo. Although mine are the ordinary brown fingers of a plain dirt gardener, each of my co-operating consultants proudly displays ten green thumbs.

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Annual Terrace and Garden Tour...

WEDNESDAY, JUNE 27, will be garden-viewing day in Denver. Six of the city's most interesting gardens will be on display for the benefit of the Denver Botanic Gardens. The tour will be sponsored by the Garden Club of Denver. Mrs. Hudson Moore, Jr., is chairman of the event.

Three gardens in Belcaro (within walking distance of each other) will be shown and three in the Cherry Hills area. At each garden an expert will answer questions and information will be available concerning who designed and who maintains each garden.

Belcaro gardens included in the tour are these:

The garden of Mr. and Mrs. Willett S. Moore, 875 South Adams — a traditional garden of varying levels featuring a variety of evergreens and fruit trees as a backdrop for many perennials and annuals. An inner court garden is a feature of the Moore home. The garden was designed by the Moores and is maintained by them and their sons.

The garden of Mr. and Mrs. Gerald R. Hillyard, 3303 East Kentucky — a spacious garden with unusual privacy for a city garden, featuring towering evergreens, shade trees, and flowering shrubs and trees. A rare collection of mountain plants is a feature of the garden.

The garden of Mr. and Mrs. H. B. Bolton, 3400 East Kentucky — a contemporary garden predominately in

white and coral hues surrounding an unusual patio decorated to coordinate with the garden colors.

Here are the gardens in the Cherry Hills area:

The garden of Mr. and Mrs. W. H. Bird, 29 Sunset Drive — an estate garden of three acres with magnificent trees and evergreens, many of which are 20 years old or more. A formal garden, a cutting garden, a vegetable garden, and a new landscaped area near the tennis court are features.

The garden of Mr. and Mrs. B. K. Sweeney, 8 Churchill Dr. — an informal two-level garden facing the Rockies, offering a wide variety of colorful perennials and annuals against a backdrop of large evergreens. An herb garden is handy to the back door.

The garden of Mr. and Mrs. Don Carney, 16 Martin Lane — a contemporary garden enclosed in a natural wood lock-log fence, featuring evergreens brightened with borders of flowers abloom throughout the spring and summer.

Tickets for \$2.50 are available from Botanic Gardens House and from Mrs. John C. Mitchell (YU. 5-0437). The price of the ticket is tax deductible. Hours of the tour are from 10 a.m. to 6 p.m.

Buses will leave Denver Botanic Gardens House, 909 York St., at 10 a.m. and 2 p.m. to make the tour. Bus tickets are 75¢ each.

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Trifolium nanum — Dwarf clover,
in high mountains.

Physocarpus nanus — Dwarf nine-
bark, a good foundation shrub.

Amorpha nana — Low indigobush,
not too well known, but good.

Viburnum opulus nanum — Dwarf
snowball, being introduced.

Amelanchier alnifolia pumila — Low
serviceberry.

Erigeron pumilus — Low fleabane,
a native daisy of the mountains.

Arnica cordifolia pumila — Low
arnica.

Caragana pygmaea — Dwarf pea-
shrub, much worthwhile.

Ranunculus pygmaeus — Dwarf but-
tercup, in high mountains.

Occasionally the specific name *re-
pens*, meaning creeping, is used to in-
dicate a dwarf plant.

P.S. Can you translate “sunflower”
in Latin? See next issue!

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SCOOPS BY SCOTT

MRS. JOHN SCOTT

WHEN AMERICAN flower arrangers think of oriental design they are usually limited to the heaven, man, and earth lines, bonsai, or the dwarfing of trees, and the tea ceremony.

It is from the tea ceremony that we learn about chabana, or the one-flower arrangement. With the proper container, vessel, accessories, maybe stones and gnarled branches, some dew (drops of water), and a bud, the Japanese can make a bouquet with a single rose, for instance.

Bouquets, as the Western world knows them, are, of course, about the farthest deviation imaginable from Japanese flower arranging. Restraint is ever present, even in fruit and vegetable arrangements, called morimona. This is the design created at the last moment in honor of an unexpected guest. And to show his haste, the host often breaks, symbolizing no time to cut, the end of a twig he may be using for line in the design. Edible plants favored for morimona include lily bulbs, lotus rhizomes, bamboo sprouts, and yams. As for fruits, certain palms, lotus, chestnut burrs, pears, pomegranates, and melons are popular.

Popular, too, are the hanging arrangements or kakebana. Moon and boat-shaped containers are the most used. The oriental employs no focal point as understood in contemporary design. The nemota, a close grouping of stems at the base of an arrangement, may be the center of interest. The de-

sign hangs at about eye level, and the holder is not visible. Plant materials used in floating designs must appear light in weight.

Airiness is also desirable in basket designs and is called kago. Baskets may contain the arrangement within the handle or project far beyond it. And if using tree materials, colored maple leaves, for instance, the basket must be without a handle. The reasoning: no one would pick up a tree and carry it around. Some baskets may have bases or stands, while others may not.

This handle restriction is indirectly influenced by the rule-of-competition, which dictates that no one part of a design, or anything else, should vie with another for attention. The orientals do not have competitive flower shows with judging but exhibits in which the honor comes from being asked to display a design.

Design from the Japanese viewpoint is saturated in symbolism. Not only do the seasons, the growth habits, and the growing areas, mountains, plains, or water edges, determine what and how plant materials may be used, but symbolism shrouds the choice of the container, the accessory (Crane and tortoise are the most used.), the placement—everything. It is probably that in this area of symbolism Westerners have the most to learn. It should put new stimulus into interpretations, themes, and flower show schedules, which at present are often ignored, especially in judging.

Symbolism is a broad subject, rivaled only by the number of schools of ikebana, flower arranging, with differing procedures. Roughly these numerous schools are divided into the classical, where bending a branch is a major project, and the modern, which nurtured abstract.

Abstract was a natural reaction to the rule-bound classical schools which differ in minute methods. Their many schools of design, crediting flowers with both sex and souls, are not unlike our many religious denominations. Most of us are hoping for heaven, but

we certainly disagree in our methods of attainment.

Religion, then, is the axis, or maybe directrix, of oriental flower arranging. To understand or acquire a feeling for flowers, one should be sympathetic toward Japanese philosophy. The Japanese themselves sum up the personal qualities desirable for anyone aspiring to be an artist with his art. The aspirants, they say, should possess a calm disposition, a gentle character, a love of self-denial, an ease and dignity of mind and manner, restraint, respect for mankind, and a religious spirit.

Groundcovers for Colorado

M. WALTER PESMAN

Aegopodium podagraria —

Bishopsweed

Ajuga reptans — Bugleweed

Antennaria rosea — Pussytoes

Arctostaphylos uva-ursi —

Kinnikinnick

Artemisia frigida —

Native sagebrush

Cerastium tomentosum —

Snow-in-summer

Ceratostigma plumbaginoides —

Blue ceratostigma

Convallaria majalis —

Lily-of-the-valley

Cymbalaria muralis —

Kenilworth ivy

Euonymus fortunei radicans —

Wintercreeper

Glecoma hederacea —

Ground ivy

Gypsophila repens —

Creeping gypsophila

Hedera helix — English ivy

Lamium maculatum —

spotted deadnettle

Lippia canescens — Native "verbena"

Lysimachia nummularia — Moneywort

Mahonia repens — Oregon grape

Nepeta mussini — Catnip

Oxalis corniculata atropurpurea —

Woodsorrel

Pachystima myrsinites —

Myrtle pachystima

Phalaris arundinacea picta —

Ribbongrass

Phlox subulata — Moss pink

Polygonatum multiflorum —

Solomonseal

Polygonum bistorta superba —

European bistort

Portulaca grandiflora —

Portulaca

Ranunculus repens — Buttercup

Sedum acre, *S. album*,

S. kamschaticum, etc. — Stonecrop

Sempervivum brauni, *S. schlehani*, etc.

— Hen-and-chicken

Stachys lanata — Woolly betony

Thymus serpyllum — Thyme

Vinca minor — Periwinkle

Viola sp. — Violet

COMMUNITY *BEAUTIFICATION PROGRAM*

A LARGE money grant will be made by Sears, Roebuck and Company to the Colorado Federation of Garden Clubs, Inc., to be used in a program for community beautification through planned landscaping. Mr. J. P. Plains, Regional Director of the Public Affairs Department of Sears, Roebuck and Company, attended the March Board Meeting and explained the program.

Reasons for this grant is to provide seed money to clubs or groups of clubs who enter outstanding proposals for projects of lasting value to the community. Only members of the Federation can qualify for a grant. Projects will be evaluated by a selections committee.

Application forms for participation in this program may be obtained from District Directors. The Directors will then send the applications to the selections committee. Grants will be evaluated on the permanent value to the community, effectiveness of design, choice of plant material, cooperation

with community groups (Chamber of Commerce, Boy Scouts, Service Clubs, etc.), and plan for continued maintenance of project.

Applications will be accepted by District Directors by August 1, 1962, and submitted to the selections committee by August 15, 1962. The winners of the grants will be announced at the State Convention in September.

The purpose of this project is to bring to the attention of community leaders the need for the planning and carrying out of community beautification. Types of projects — landscaping of city parks, library grounds, roadside parks, historical markers, entrances to cities, and others, so long as the project is not on privately owned property.

Complete rules and application forms can be obtained from District Directors. If there is any question about the applications write to your Director or State President.

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*Golden Slippers

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"GROWING IS OUR BUSINESS"

The Green Thumb

Magazine for Rocky Mountain Gardeners

JULY 1962

25 CENTS





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"GROWING IS OUR BUSINESS"

JULY
Vol. 19
No. 6



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THE COVER

CLIMBER ROSE 'ROYAL LAVENDER'

Photo Courtesy of Jackson and Perkins Company
Newark, New York

Notes and Notices

THANK YOU — For the kind words about THE GREEN THUMB in the May 1962 issue of AMERICAN ROSE MAGAZINE we extend our thanks. Cited particularly was the article "Timetable and Methods Used in Growing Roses in the Rocky Mountain Region" by Clyde E. Learned in the March 1962 issue of THE GREEN THUMB.

MOUNT GOLIATH ALPINE TOUR — July 20 is the date members and friends of the Colorado Federation of Garden Clubs, Inc., plan a field trip to Mount Goliath Alpine Garden.

Chartered Busses will depart from Continental Bus Terminal, 17th and Broadway, at 8:00 a.m. and a stop will be made at the Westland Shopping Center at 8:30 a.m. Busses will be back in Denver at approximately 4:00 p.m.

Definite reservations plus \$2.00 must be sent to Mrs. J. J. Carroll, 2070 Field, Lakewood, by July 10. No cancellations or refunds can be made after that date.

Bring picnic lunch, wild flower books or check lists, bird books, and your camera, if you wish. Wear warm clothing and walking shoes.

ANNUAL MEETING — The annual meeting of the Denver Botanic Gardens, Inc., was held at Botanic Gardens House on March 19. Encouraging reports from the various committees were heard.

The following people were recommended and elected by unanimous ballot:

President — Mr. Lawrence A. Long

Vice-Presidents — Mrs. James J. Waring

Dr. J. R. Durrance

Mrs. J. Churchill Owen

Secretary — Dr. Moras L. Shubert

Treasurer — Mr. John Mitchell

Executive Committee — Dr. J. R. Durrance

Mrs. George H. Garrey

Mrs. Ed H. Honnen

Mr. Lawrence A. Long

Mr. John Mitchell

Mrs. Frank McLister

Mrs. James J. Waring

The resignation of Mr. John B. Welborn, because of his moving from this region, was accepted with regret.

CONVENTION — The 85th Annual Convention of the American Nurserymen's Association will be held at the Denver Hilton, July 21-26. Preregistration indicates that over 1,000 people will be in attendance from all over the United States. Business and educational meetings will be on Monday, Tuesday, and Wednesday. On Thursday the group will tour the Trail Ridge Road by bus.

REDEDICATION OF PLAQUE — The tentative date of July 19 has been set by the American Nurserymen's Association for the rededication of the plaque which honors C. C. Perry, discoverer of the Colorado blue spruce. The plaque originally was located in Bear Creek Canyon near Evergreen and was first dedicated in 1928. Because of new highway construction the plaque was taken down in 1958. The new location of the plaque will be near the original location on a turnoff provided by the State Highway Department.

FOR SALE — Versatile picnic tables made of 2-inch treated redwood are for sale at Botanic Gardens House. Adjustable feature makes them readily usable either as a picnic table or as a garden bench. They are very sturdy. Sale price of one unit is \$15.00; two units, \$25.00.

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m. KLZ Radio.
The Green Thumb Program by Herbert Gundell, Denver County Agent

Every Saturday Afternoon — 4:30 p.m. KLZ-TV, Channel 7.
The Weekend Gardener by Herbert Gundell

AT BOTANIC GARDENS HOUSE

JULY

- 2nd — Mon., 9:30 a.m., Denver Botanic
Gardens Junior Committee
5th — Thurs., 7:45 p.m., Orchid Society
6th — Fri., 7:30 p.m., Botany Club
9th — Mon., 10:00 a.m., Judges' Council
10th — Tues., 9:15 a.m., Sunburn & Blisters
Garden Club Meeting
10:00 a.m., Herbarium Study Group
11th — Wed., 7:30 p.m., Landscape
Contractors
2:00 p.m. THE GREEN THUMB Edi-
torial Committee Meeting

16th — Mon., 4:00 p.m., Denver Botanic
Gardens Board Meeting

18th — Wed., 9:30 a.m., "Fun with Flowers"
Workshop

22nd — Sun., 2:00 p.m., Colorado Cacto-
philes

25th — Wed., 7:30 p.m., Landscape
Contractors

26th — Thurs., 1:00 p.m., Ikebana Inter-
national Flower Arranging Class

AUGUST

1st — Wed., 7:30 p.m., Botany Club

2nd — Thurs., 10:30 a.m., Crestmoor Park
Garden Club Tour
7:45 p.m., Orchid Society

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Botanical Methods of

PROSPECTING for ORE DEPOSITS

HELEN L. CANNON

U.S. Geological Survey, Denver, Colorado

ORE DEPOSITS of any economic size are becoming increasingly hard to find. Prospectors have long since panned most of the streams and looked at most outcrops of rock in the United States for signs of metal. The undiscovered ores thus lie at depth under a concealing cover of soils and barren rock. Can the roots of plants penetrate this cover and by the quantity of metals they absorb tell us where to look for ore? The answer is yes. Ore deposits have been found in many countries by analyzing the plants growing on the ground surface. Some examples of such deposits are these: tin and tungsten deposits in Cornwall; arsenic in the Far East; vanadium in Sweden; copper, iron, and molybdenum in the U.S.S.R.; zinc deposits in Belgium; and silver, gypsum, copper, asphalt, and uranium in the United States.

To make use of plant analysis in prospecting it is necessary to know first how much of the element in question normally occurs in a given plant species, for the different plant groups absorb different amounts of each element depending on their individual chemistry. The prospector must learn to distinguish the various plants being considered as a possible medium and he must have representative samples of these species tested for the metal in question in both mineralized and unmineralized areas to learn what concentration would indicate mineralized ground. Such information as is available both in Geological Survey files and in the literature has been compiled to furnish background information on the metal content of various classes of vegetation, such as conifers, deciduous trees, legumes, grasses, vegetables, and herbs. The latest average figures for some metals in major types of vegetation in this country have been computed from more than 10,000 analyses. It is apparent that trees contain more barium, lead, and zinc than herbs but less molybdenum, for instance, and that the amount of each metal absorbed is quite different.

Research on the use of tree analysis in prospecting for uranium on the Colorado Plateau was conducted by the U. S. Geological Survey on behalf of the U. S. Atomic Energy Commission and the method was tested by analyzing more than 10,000 trees. We found that pinon and juniper rooted in barren sandstone had an average content of 0.5 ppm or .00005 percent uranium but those plants rooted in mineralized ground contained an average of 1.5 ppm. The method is useful in areas where the tree or shrub cover is uniform and where the ore-bearing bed is 20-30 feet below the surface, although where ground-water conditions were favorable, ores were indicated by plant analysis at depths up to 70 feet. Live juniper roots were dug out of the Rifle mine on the western slope at a depth of over 300 feet beneath the ground surface. In prospecting for any metal it is important to sample the same part of the tree at the same height above the ground and from the entire circumference of the tree to ensure a representative

composite sample. Generally, leaves or branch tips are preferred to wood because the ash can be mixed and quartered to give more reproducible analyses. The ash of wood knots cannot be combined satisfactorily with the rest of the ash. In our laboratories, the samples are dried, ashed, and then analyzed fluorimetrically, spectrographically, or colormetrically for the element in question. The plant assay data can then be contoured on maps of the area to indicate whether favorable ground is present.

Two other methods of plant prospecting require more botanical training. Essentially they are based on the physiological effects of the ore minerals on the well-being of the plant and the related effect on the distribution of each plant species that occurs in the area. Observations can be made of the vitality, development, flowering, growth, abnormalities, shape and size, and so forth. The ore constituents may affect the plants directly or the change in acidity may change the availability of major plant nutrients and so affect indirectly the health of the vegetation.

Abnormally white plants of anemone with apetalous sterile flowers are known to occur on nickel-cobalt deposits in the U.S.S.R. Plants with abnormal terminal growth and a 2-cycle flowering habit are used to outline areas for bitumen sampling in Russian oil surveys. Changes in the shape of pickleweed plants are common over borate deposits. Radioactivity in the soil near uranium and thorium deposits can produce curious effects. Blueberry plants with unusual-shaped fruits; color variations in fireweed; abnormal divisions of the spikes and development of apetalous flowers on *Stanleya*; enlarged basal rosettes raised 10 inches off the ground on *Grindelia*, and so forth, have been observed. Yellowing of the leaves, a

symptom of iron deficiency so common in Colorado, can be used in prospecting in zinc and copper districts because an excess of these metals will cause an iron deficiency in the plant. In the Platteville, Wis., zinc district, a white oak tree near a zinc pit had green leaves on one side of the tree and yellow ones on the other. The yellow leaves contained 0.1 percent zinc and the green ones only .014 percent. The color pattern has been used in prospecting for zinc in the tri-state district of Missouri, Kansas, and Oklahoma.

The effect of metals on the plant population is also of use in prospecting. A high metal content in the soil can poison the soil for all plant life so that bare areas result. These have been used in prospecting for copper in the Congo, Armenia, and Rhodesia; pyrite in Italy; platinum in the Urals; and chromium and strontium in this country. On the other hand the metals may only restrict certain species of plants and encourage others so that a characteristic flora develops. In such a flora certain indicator species may be found that only grow in mineralized soil. These may require a specific element contained in the ore but not necessarily the chief metal being prospected for. Thus plants that require sulfur can be used in prospecting for various types of sulfide deposits. *Thlaspi*, pennycress, has been used to find zinc deposits in Belgium, *Eriogonum*, wild buckwheat, to find silver, gypsum, and copper in the United States, and the wild onion for asphalt and uranium. The Geological Survey developed a method of using selenium-indicator plants in their search for uranium on the Colorado Plateau. We found that certain species of *Astragalus*, poisonvetch, primarily *A. patersoni* and *A. preussi* (Fig. 1) occurred only on mineralized ground and that their distribution could be mapped



Fig. 1. *Astragalus preussi*

to show areas favorable for drilling. *Stanleya*, prince's plume, although it requires both selenium and sulfur, cannot grow directly rooted in the deposits because of its sensitivity to radiation but is sometimes useful in delineating drainage from mineralized areas.

The most interesting direct indicators of a particular metal, are those that require copper. Those species that require and absorb large amounts of copper and hence can be used successfully in prospecting belong chiefly to three plant groups: the Caryophyllaceae or pink family, the Labiatae or mint family, and the mosses. A blue-flowered basil, *Ocimum homblei* (Fig. 2), has been used with great success in Rhodesia. It will not grow in soil that contains less than .01 percent copper. The occurrence of *Ocimum* is currently being mapped in both northern and southern Rhodesia by the Rhodesian Selection Trust. Copper mosses are another interesting group. Certain species of moss in Sweden were shown to require large amounts of copper; these same species have been found in Alaska growing on soils rich in copper. Prospecting was done in Sweden by examining localities from which the herbarium specimens of the copper mosses had been collected. In the United States the most striking association of a flowering plant with copper mineralization is that of the California poppy, *Eschscholtzia californica*, in Arizona.

When poppies are in bloom, the display is wonderful in all the copper camps of the lower desert. At San Manuel the poppies grew in profusion on a pie-shaped piece of mineralized ground that was bounded by two faults. No poppies grew on the barren ground across the faults.

Botanical methods of prospecting have been most highly perfected and are most widely used in the U.S.S.R. where plants are studied automatically on every geologic survey. Much less use of plants has been made in the United States. Many gaping holes exist in our present knowledge. The absorption of metals by various plant groups in different soil environments needs to be studied and a systematic study of many types of metal deposits should be made for indicator species and for signs of disease or genetic change that could be used in prospecting. Areas long known to have deficiency or toxicity problems affecting livestock need to be appraised from the geological point of view both in prospecting for ores and in regard to animal and human health. Trace elements in plants are important and vastly interesting. This borderline field requires the integration of botanical, chemical, geological, and medical knowledge. There are many niches in this study program for the individual with a "green thumb."

Fig. 2. *Ocimum homblei*



SOME DISEASES OF SHADE TREES

DR. J. C. CARTER Illinois Natural History Survey Urbana, Illinois

Dr. Carter is Head of the Section of Applied Botany and Plant Pathology, Illinois Natural History Survey. He is a past president of the National Shade Tree Conference, now the International Shade Tree Conference.

On January 29, Dr. Carter presented an illustrated talk on diseases of shade trees at the Colorado Nurserymen's and Arborists' Short Course at Colorado State University, Fort Collins. Here is the first part of an article based on his talk, which deals with leaf diseases. The second part, which deals with stem and vascular diseases, will appear in the next issue of *THE GREEN THUMB*. (Editor)

SHADE TREES are subject to many diseases. Some of these diseases cause damage to limited portions of trees and they may be considered as minor problems or nuisances. Such diseases include some of the foliage diseases like leaf spot, leaf blotch, leaf rust, scorch, and chlorosis. Other diseases that are much more detrimental to trees may result in the killing of branches or roots or the ultimate death of entire trees. Some of the more destructive diseases include fire blight, *Cytospora* canker, and *Verticillium* wilt. While the disfiguring of trees by diseases affects their aesthetic value, the killing of trees represents huge monetary losses, especially in terms of real estate values. Based on values established by the Shade Tree Evaluation Committee of the International Shade Tree Conference, the monetary worth of a specimen American elm in the midwestern region is as follows: a 10-inch dbh tree, \$190; a 12-inch dbh tree, \$260; a 16-inch dbh tree, \$480.

Because of the tremendous losses caused by diseases of shade trees it is exceedingly important that arborists and nurserymen be able to identify the various types of diseases and to administer or recommend the proper con-

trol measures. It should be remembered that any condition or agent that interferes with normal functioning of a plant may be considered a disease.

For convenience, the agents or conditions that cause diseases of trees may be considered according to the part of the plant they attack or effect. On this basis they may be divided into leaf diseases, stem diseases, vascular diseases, and root diseases. The various agencies and conditions that can cause tree diseases include living or infectious agents, and nonliving or non-infectious agents. Infectious agents include fungi, bacteria, viruses, mistle-toes, and nematodes. Noninfectious agents include internal physiological disturbances, unfavorable climatic conditions, chemical injuries, and mechanical injuries. To effectively control a disease it is necessary first to know which of these various agents or conditions is the cause of the disease.

LEAF DISEASES

Infectious leaf diseases are caused mainly by fungi. However, some may be caused by viruses or bacteria. They may produce moldlike growths on the leaf surfaces, local lesions in the tissues, or death of the entire leaf. Dis-

eased leaves may be yellow, brown, spotted, mottled, curled, wilted, distorted, dead, or detached. Some leaf diseases may affect flowers, fruits, twigs, and young branches. The names of these diseases are usually descriptive of the type of injury produced, such as leaf spot, leaf blotch, leaf rust, scorch, chemical injury, and chlorosis.

Leaf Spot — Many leaf spot diseases become conspicuous during July and August; however, some may cause noticeable injury and occasionally severe defoliation earlier in the growing season. Occasionally some of them may deform or kill flowers, fruits, twigs, and young branches. Most leaf spot diseases develop as small, scattered, circular to oval, light to dark brown, dead areas. Later the spots may enlarge and unite to form large, angular to irregular, dead areas. Minute black dots, fruiting bodies of the fungus, may appear embedded in tissues of the diseased areas. On some trees the spots may have red to reddish-brown margins, as on chestnut, linden, oak, poplar, and redbud. On other trees the spots may be bordered by purple as on ash, crabapple, and hawthorn. The spots on walnut are large, dark brown, and round to oval. On cherry the brown, dead areas of tissue drop out in time, leaving a shot-hole appearance of the leaf. One leaf spot disease of crabapple and hawthorn produces minute purple specks soon after the leaves unfold. These specks soon enlarge to form reddish-brown, circular to oval spots. After remaining in this condition a few weeks, some of the spots may start to enlarge again and form concentric rings of dark brown. These rings give rise to the term “frog-eye.”

Leaves may be protected against leaf spot diseases by spraying with fungicides. Sprays recommended for



Purple-bordered leaf spot of red maple

the control of some common leaf spot diseases are organic mercury (Puritized Agricultural Spray, Coromerc, or Phix), dodine (Cyprex), dichlone (Phygon XL), and Boardeaux mixture. Two or three applications of spray should be made at 14- to 21-day intervals. The first spray should be applied approximately three weeks before the spots appear on the leaves, about June 15 for most leaf spot diseases in the central and western states.

Leaf Blotch — Leaves affected by leaf blotch have small to large, irregular diseased areas. The diseased areas become principally reddish-brown in color but with narrow yellowish margins. These areas may be confined to the margins of the leaves or to tissues between the veins or they may affect most of the leaf area including midrib, veins, and tissues between veins. In time the whole leaf may turn brown and fall prematurely. Trees which have been severely defoliated for several successive years may become stunted. One of the more common wide-spread leaf blotch diseases occurs on horsechestnut. It is caused by the fungus *Guignardia aesculi*. The sprays recommended for the prevention of this disease are zineb (Parzate or Dithane Z-78) and ziram (Zerlate). Two or three applications of spray should be made at 10- to 14-day intervals. The first application should be made when the leaf buds are opening.

Leaf Rust — The fungi that cause leaf rust produce several types of symp-

toms. They may produce discolored, swollen spots on leaves, cause leaves to become distorted, or cause leaves to turn yellow or brown and fall. Fruiting bodies of the fungus may develop in the diseased tissues and become conspicuous as yellow, red, or brown enlarged structures. Rusts of juniper are common and wide-spread. The two major rusts of juniper are cedar-apple rust (*Gymnosporangium juniperi-virginiana*) and cedar-hawthorn rust (*G. globosum*). These two rust diseases affect most varieties and forms of *Juniperus virginiana* and *J. scopulorum*. However, most of the varieties and forms of the other juniper species are resistant to these rust diseases.

These two rusts produce chocolate-brown, globular to irregular-shaped, corky galls on juniper. The galls of cedar-apple rust measure up to one to two inches in diameter and are called cedarapples. Those of cedar-hawthorn rust are much smaller. The galls of these rusts mature the second spring after infection. The mature galls develop gelatinous orange spore horns during rainy periods in April and May. The spore horns on the cedar-apple rust galls are numerous and fingerlike. The spore horns on the cedar-hawthorn rust galls are relatively few and wedge-shaped. Spores produced on the spore horns on the cedar-apple rust galls cause rust on leaves of apple and crabapple. Spores produced on the spore horns of the cedar-hawthorn rust galls cause rust on leaves of apple, crabapple, hawthorn, mountain ash, pear, quince, and serviceberry. The rust spots on the leaves of these deciduous plants appear as yellow to orange colored spots on the upper surfaces and as raised orange to brown spots, covered with hairlike appendages, on the under surfaces. Spores produced on these hairlike appendages are carried

by wind to leaves of juniper, where they cause infections that give rise to another crop of cedar galls.

Because these rusts require not only juniper but also crabapple or other pomaceous hosts in their life cycles, each fungus cannot perpetuate itself if the alternate hosts are separated by distances greater than the distances spores are carried by wind. Adequate protection usually is given by distances of a mile or more.

In ornamental plantings where alternate hosts are growing close to each other, protection can be obtained by fungicidal sprays. The foliage of crabapples and other deciduous hosts can be protected in April and May by four to five applications of a spray composed of $\frac{1}{2}$ pound of ferbam (Fermate or Niagara Carbamate) and 3 pounds of wettable sulfur in 100 gallons of water. The first application should be made as soon as the spore horns on the cedar galls start to emerge, usually in early April. Additional applications should be made at 7- to 10-day intervals.

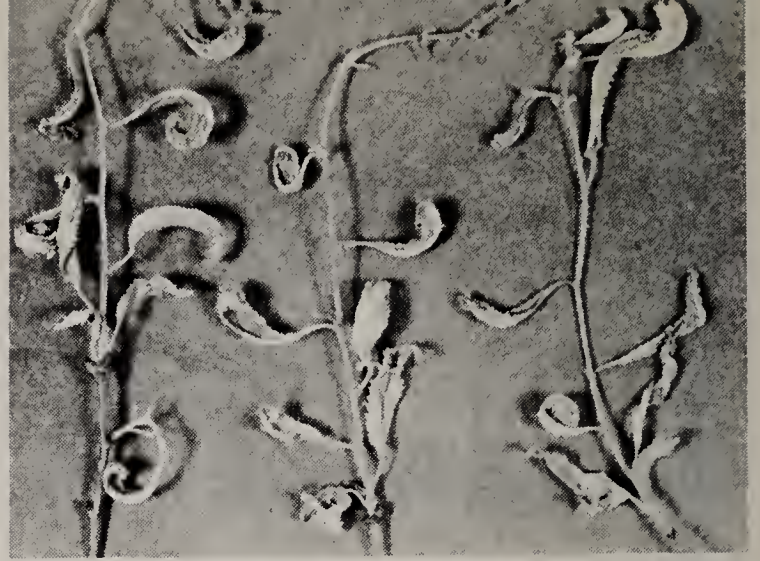
There are two periods when junipers may be sprayed for the control of these rusts. One period is in April or early May, when the orange spore horns appear on the cedar galls. The other period is in July and August, when junipers are susceptible to new rust infections from spores produced on diseased leaves of crabapple, hawthorn, or other deciduous hosts. Cycloheximide (Acti-dione or Acti-spray) applied during the first period, after the spore horns have appeared and before they become gelatinous, will kill the horns and prevent spore production. Ferbam (Fermate or Niagara Carbamate), $\frac{1}{2}$ pound, and wettable sulfur, 3 pounds, in 100 gallons of water, applied during the second period will protect junipers from spores produced on

the foliage of the deciduous hosts.

In general, infectious leaf diseases usually cause only limited damage to shade trees unless infection occurs year after year. Severe infection and defoliation for several successive years may weaken affected plants and make them more susceptible to attack by other diseases and by insects. They may lower the resistance of plants to withstand unfavorable weather conditions. Defoliation in late summer is less injurious than defoliation in early summer, since growth is mostly completed by late July. Defoliation of evergreens during a single growing season may cause severe dieback of branches or death of whole plants.

Noninfectious leaf diseases include such troubles as scorch, chemical injury, and chlorosis.

Scorch — This disease of leaves develops as yellowing or browning of tissues between the veins or along the margins, or as complete browning and withering of leaves. It may be caused by internal physiological disturbances, unfavorable weather conditions, low temperature, drought, girdling roots, or limited soil area for root growth. Scorch develops usually during July and August when the roots are unable to furnish sufficient water to compensate for the moisture lost from the leaves during prolonged dry periods. Injury from drying winds when the temperature is high will increase the amount and severity of scorch. Trees affected with scorch may lose many leaves during later summer; however, usually they do not die. Trees in low vigor may be aided in overcoming scorch by feeding and watering. Sometimes it may be advisable to remove weak, interfering, or poorly spaced branches to reduce the total foliage load that must be supported by the root system.



English elm leaves severely injured by 2,4-D

Chemical Injury — In recent years, chemical injury to trees has become frequent largely because of the common and wide-spread use of herbicides such as 2,4-D and 2,4,5-T. Injury caused by spray drift or vapors of these materials appears as deformed growth or as dying of trees. In mild cases of injury the leaves of some trees such as elm, hackberry, hickory, honeylocust, and oak may become thickened and leathery; the tips and margins of the leaves may be cupped downward or the leaves may be rolled. More severe injury may cause leaves to grow long and narrow and the veins to appear unusually prominent. Severely injured leaves of cherry, birch, black locust, elm, hawthorn, honeylocust, Russian olive, sycamore, and walnut may be twisted or rolled and appear boat-shaped or curled into ram's-horns. In time the leaves die. Many trees recover in succeeding years from mild injury caused by herbicides. Feeding to stimulate growth may aid in their recovery. Severely injured trees may have many branches killed or the trees themselves may die.

Chlorosis — Trees suffering from lack of available nutrients such as aluminum, iron, magnesium, zinc, and other elements usually show abnormal color of the leaves or abnormal types of growth. Probably the most common type of deficiency disease is chlorosis caused by the unavailability of iron. Chlorosis frequently occurs in soft

maple and pin oak. It occasionally occurs in other deciduous trees and in evergreens. In deciduous trees it develops as yellowing of tissues between the veins. In severe cases the leaves curl and turn brown along the margins, or angular brown spots may appear between the veins. Later leaves may die and the tree may be stunted in growth and die.

Chlorosis may develop because of unfavorable conditions in the tree or in the soil for the utilization of iron. Under alkaline conditions, iron changes to insoluble forms. Frequently trees recover from chlorosis when they are supplied with available iron. The iron may be sprayed on the leaves, introduced into the trunk, or added to the soil. Spraying the foliage usually corrects chlorosis of the leaves that are treated but it is not likely to benefit leaves produced after the iron has been applied. A spray composed of five pounds of iron sulfate (ferrous sulfate) and two pounds of soybean flour in 100 gallons of water is most effective when applied in late spring or early summer, during the time that the leaves are increasing in size.

Introducing iron into the trunk of an affected tree may correct chlorosis for several years. The tree may be treated through holes, each approximately $\frac{1}{2}$ inch in diameter, bored in the trunk at an oblique angle. The holes should slant downward and penetrate the sapwood to a depth of only one or two inches. The iron may be placed in the holes as a dry powder in large gelatin capsules or forced into the trunk in water solution by the use of special equipment. The usual dosage is five grams of iron sulfate per inch of trunk diameter. Best results from this method of treatment are obtained when the iron sulfate is applied before leaves appear in the spring.



Oak leaves showing symptoms of good health (left), chlorosis (center), and scorch (right)

In soils that are neutral or only slightly alkaline, more lasting results are obtained if equal parts, by weight, of iron sulfate and sulfur are added to the soil. The sulfur is added to acidify the soil. Iron is changed to soluble forms in acid soil. To stimulate growth of chlorotic trees, the iron sulfate and sulfur should be supplemented with tree food. The iron sulfate and sulfur mixture is applied at the rate of one to three pounds per inch of trunk diameter at breast height. The heavier rate of application mentioned is for trees over six inches in diameter.

Chelated iron and other specially prepared iron compounds have been recommended as being more effective than ferrous sulfate for correcting chlorosis in many kinds of plants. These types of material are sold under various trade names and should be used as recommended by the manufacturer.

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THE MAGIC of HYBRIDS

THEODORE C. TORREY

Director, Vegetable Research

W. Atlee Burpee Co.

WHENEVER YOU see the word hybrid in an ad, an article, or a seed catalog, do you wonder to yourself just what there is about this word that warrants all the bally-hoo? Is there magic in hybrids?

In present-day usage the word hybrid refers to the true F_1 or first generation product of a cross between unlike individuals.

Back in the twenties corn breeders discovered that by crossing individual corn plants with distinctly different characteristics, the resulting progeny often exceeded either parent in performance. This phenomenon is known as heterosis or hybrid vigor. Since corn was a plant that had separate male and female flowers, it was relatively easy to plant the two selected parent lines side by side in the field and remove all the male flowers or tassels from the one parent line and let the wind make the cross. Seed, of course, was saved only from the rows which had had the tassels removed.

Knowing that hybrid vigor showed up in hand crosses made between two

different tomato varieties, David Burpee urged his plant breeders to experiment with methods of producing hybrid seed for American gardeners.

Tomatoes, unlike corn, do not have separate male and female flowers, but produce what botanists term "perfect flowers," that is, flowers with both male and female parts in the same flower.

In order to make hybrid tomato seed, the stamens or male flower parts had to be removed from one parent before any pollen was shed. Then pollen had to be collected from the other parent and carefully placed on pistil or female part by hand. This was, of course, very costly and tedious hand work, but the magic of hybrid vigor displayed in the product of the cross appeared to be well worth the effort and added expense.

Since all crosses between unlike parents do not produce exceptional results, many experimental crosses had to be made and tested before outstanding hybrid combinations were found. As a result of this work the first commercial F_1 hybrid tomato, Fordhook

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Victor Tawara

Hybrid, was offered to American gardeners by Burpee in 1945. At the same time the Burpee Hybrid cucumber made its debut. Hybrids in other classes followed and at the present time hybrids are offered in all the following classes: tomatoes, eggplant, squash, onions, spinach, cantaloupe, cucumbers, cabbage, Chinese cabbage, and watermelons.

The magic of hybrid vigor shows up in increased yields, disease resistance, drouth resistance, superior quality, and that extra oomph that enables hybrids to succeed in seasons where the older non-hybrid varieties just cannot make it.

There is another big advantage to hybrids over non-hybrid varieties — desirable characteristics of two varie-

ties can be incorporated into one individual. Burpee Hybrid cantaloupe is a perfect example of this, as it combines the very early maturity of one variety with the superb quality and thick flesh of a rather late maturing variety.

Have plant breeders reached the peak in present day hybrids? Not by a long shot in the opinion of many. New and superior hybrids will continue to be developed and as techniques of production are worked out, there will be hybrids introduced in other classes of vegetables.

If you have been sticking with the old faithful vegetable varieties and have not succumbed to the magic of hybrids, it's time you should. You'll not be disappointed.

Hints on **PROPER SELECTION**

M. WALTER PESMAN

DOING THINGS systematically, without undue hurry, is good in business and good for the garden.

Planning what is needed and where it is to be planted is, of course, the first step and perhaps the most important one. Few people go shopping without a well-considered shopping list; why not use the same system for ordering planting material for the garden instead of "falling for" anything in the catalog that seems attractive?

In garden planning a "wishing list" comes before a shopping list. It is good judgment to write down on paper all the things and plants you want in your home grounds and then to check the possibles and impossibles. That way only you can safeguard yourself against a cluttered-up place.

All right then, we'll suppose you

have a well-considered shopping list prepared and are ready to fill it. What is the next step?

It is well to remember that any plant material to grow in our unusual climate has a better chance of survival if it is used to a similar climate. This is considered self-evident as far as temperature is concerned. Nobody would think of sending to Florida for blue spruces. Sad to state, the same caution does not seem to prevail for loads of beautiful arbor-vitae that come through our state from Texas to be peddled here. People still fall for them by the dozens every spring. Then, after one or two years, when said arbor-vitae are barely alive, and then only, do they recognize their mistake. By that time they have lost a valuable opportunity for garden pleasure.

SCOOPS BY SCOTT

MRS. JOHN SCOTT

BIENNIALS ARE regarded as the poor kin of annuals and perennials. Biennials are supposed to complete their life span from seed sown to seed matured within two years. But their behavior may more nearly resemble that of either annuals or perennials because of variety, climatic conditions, cultural practices, time of sowing, etc.

Time to sow is at hand, right now, or as soon as possible. A few biennials benefit from late June seeding, but the bulk prefer July, with early August still all right. This is one of the big advantages of raising biennials. They can be given attention between early and late gardening periods. The biennials may be planted where they are to bloom next spring or planted with transplanting in mind.

Most of the biennials are fibrous rooted, and transplanting is a breeze. One-half cup of a high-analysis, quickly soluble fertilizer applied to each plant about three days before transplanting is beneficial. Then, the new plastic spray is recommended for the prevention of wilt. It, too, is best applied before the act of transplanting. As most, if not all, transplanting takes place early in the spring, the sun shouldn't be too hot, either.

Early spring bloom is another advantage of biennials. They may be used in the early mixed border, or as a groundcover for the early bulbs. Once their blooming period is over, they can be discarded and replaced immediately. Either annuals or later blooming perennials make good combinations. Chrysanthemums might replace foxgloves, gladioli follow Canterbury bells, etc. Biennials are especially good for the small property desiring a maximum of bloom.

Biennials can save work, time and money, because several of them self-sow true to type. Mr. and Mrs. Bush-Brown in *America's Garden Book* list foxglove, forget-me-not, rose campion, steeple bellflower, and hollyhock in this category. These same authors suggest for city conditions the following plants: Canterbury bells, English daisies, forget-me-nots, foxgloves, pansies, violas, and wallflowers. And the same list is recommended for pot culture with the exception of English daisies, which they eliminate.

In this area winter eliminates many of our plants. Mulching with non-packing (nix on smothering) materials is advocated for all the biennials. Evergreen boughs are tops, and their needles help add acidity to our alkaline soil. These biennials are thought to be hardiest, or most apt to overwinter satisfactorily: rose campion, foxglove, hollyhock, steeple bellflower, honesty, hornpoppy, sweet-william, Siberian wallflower.

This list includes the old reliable and some varieties fresh from the hybridizers: (If you would have an easy, different garden, grow biennials for both landscaping and cutting purposes.)

Wing-everlasting, *Ammobium alatum grandiflorum* — about 3 ft. high, very showy, white.

Blazing star, *Mentzelia laevicaulis* — 4 ft., leaves white, wavy-toothed, 4-inch yellow flowers.

Canterbury bells, *Campanula medium* — double-flowered, blue, rose, and white blooms. (There are single-flowered and dwarf bedding varieties.)

Cup and saucer, *Campanula calycanthemata* — 4 ft., blue, lilac, rose, or white in color. (There are hybrid varieties with double and single flowers.)

Chimney or steeple bellflower, *Campanula pyramidalis* (listed sometimes as a perennial) — 5 ft., blue or white, blooms all summer.

Wallflower, *Cheiranthus* — small, fragrant, likes alkaline soil. (All are winter hardy except *C. kewensis*.)

Siberian wallflower, *Cheiranthus allioni* — bright orange blooms.

Foxgloves, *Digitalis* — many varieties, colors, and heights, probably most popular of the biennials. (Giant rusty foxglove is 6 ft., rusty red, downy outside, lower lip bearded.)

Angelica (herb)—5 ft., large leaves, white flowers. (There are more to be found in herb listings.)

Hollyhock, *Althaea rosea*—(try the double varieties, the new dwarfs, etc.)

Honesty, St. Peter's penny, money plant, *Lunaria biennis* — used for winter bouquets, known as an everlasting.

Iceland poppy, *Papaver nudicaule*.

Rose campion, *Lychnis coronaria*.

Pansy, *Viola tricolor*.

Michauxia campanuloides—erect, 3 ft., pendant star flowers of waxy whiteness.

Common stock, *Mathiola incana* — an evening-scented stock.

Forget-me-nots, *Myosotis alpestris* and *M. dissitiflora*.

Evening primrose, *Oenothera lamarckiana* — 3 ft. tall, large bright yellow flowers.

Sweetwilliam, *Dianthus barbatus* — often listed as an annual.

Purple mullein, *Verbascum phoeniceum* — has a tap root which makes it more difficult to transplant.

Carrots and parsley (vegetables) — interesting, good for dried designs, etc.

If your local dealer doesn't have these seeds, send to Geo. W. Park Seed Co., Greenwood, South Carolina, or to some other seed company.

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The awards were made by All-America Rose Selections, a national association of major garden rose nurseries and breeders and introducers of new roses. AARS has been testing roses prior to their introduction since 1940, when the competition was started.

Royal Highness and Tropicana earned their distinction as America's newest prize roses by outperforming hundreds of competing new varieties entered by hybridizers throughout the world into the country-wide U. S. trials.

Their triumph was attained over the most outstanding new roses. Entries are usually confined to those new plants that demonstrate to their originators their potential to contend with the keen competition expected in the grueling AARS testing and judging program.

TESTING SYSTEM

AARS maintains 24 official trial gardens throughout the United States. These stations are located so that all climate and soil variations will be represented. Candidate plants are grown under actual garden conditions for two years.

During this 24 month trial period they are continually evaluated by the nation's leading professional rose judges. This panel ranks and scores the new plants using a uniform point



Hybrid
Tea Rose
'Tropicana'

Photo
Courtesy
of AARS

Hybrid
Tea Rose
'Royal Highness'

Photo
Courtesy
of AARS



system. The highest scoring plants — those that prove superior performance — are cited as the All-American Rose winners.

Tropicana and Royal Highness, according to the judges, excelled in vigorous growth, hardiness, and quality of flower. Both triumphed over all competition in important other traits necessary for a truly outstanding rose:

disease resistance, non-fading color, novelty, fragrance, and the ability to perform outstandingly in any garden soil and under wide variations of weather.

For the home gardener, Royal Highness and Tropicana represent the near perfection in flowering and growth that can be achieved through today's modern rose breeding.

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Building and Maintaining a **GOOD LAWN *in* COLORADO**

GEORGE W. KELLY

This is the fourth and last of a series of articles on lawns, prepared by members of the Swingle Study Groups. The first of this series dealt with the preparation of the soil; the second, seeding and kinds of seed; the third, care of a new lawn; and this one, control of weeds, insect pests, and diseases and lawn repair.

WEED CONTROL

THE FIRST ANNUAL weeds that come up in a new lawn are handled best by simply mowing when they become tall enough to be cut by the mower. When older lawns are overrun by weeds, it is an indication that conditions are not right for the growth of lawn grasses, for weeds come where there are vacant places in the lawn. Such weeds as dandelions and plantain need not be a problem any more; they are easily controlled with 2,4-D. Such persistent plants as chickweed, euphorbia, and yarrow may take a little persistence to eliminate, but again, if the vigor of the grass is kept up, weeds need be but a small problem.

Crabgrass worries many gardeners, and it can be classed as a weed. Since it is an annual, it can be controlled by methods that will leave the permanent lawn grasses practically unharmed. Many people never discover that they have crabgrass until August, when it begins to turn purple and becomes quite conspicuous. There are treatments which will kill it at this time, but generally it is not practical to go to much trouble to eliminate it at a time when it has already done its damage and will naturally be killed by frost in a few weeks. The best time to control crabgrass is just before or just after it sprouts. There are several pre-emergence and post-emergence crabgrass killers on the market that will do the job with little damage to the good grasses. If a lawn has been allowed to become overrun with crabgrass one year, it is usually a good practice to attempt to destroy the hold-over seeds in the lawn. This gives a fresh start at least. Then, good cultural practices (especially in April or May, before the crabgrass seeds germinate) should prevent its reappearance. Arsenate of lead and chlordane are two of the products which have been extensively used to kill crabgrass seeds; many brand-name killers contain one of these in some form. There are several newer chemicals that have been used recently. These are applied generally between the time all the seed is ripened in the fall and the time it may be expected to sprout in the spring (June 1 or earlier). You may use these chemicals under their own names if you are willing to handle them carefully or you may pay higher prices for brand-name preparations that contain them. Their excessive or repeated use may cause a buildup in the soil of harmful chemicals.

Keep these facts in mind: Crabgrass is an annual and leaves only its seeds over winter. Crabgrass only thrives in sunny places. Crabgrass does not sprout until the ground gets warm, usually around the last of May or the first of June. Crabgrass seed must have bare soil with sun shining on it to germinate. It is much

more worthwhile to treat the lawn in April and May so that there is such a dense stand of bluegrass that there is no room for crabgrass, than to let the crabgrass get started and then try to kill it. Crabgrass is often the sign of a weak lawn. When lawn grasses are growing vigorously there is little room for crabgrass or other weeds to get started.

Allowing the good grasses to run down and then annually applying a dope to the crabgrass is rather poor gardening. The frequent application of chemicals against crabgrass may leave accumulations in the soil which are detrimental to the good grasses. Very often the good grasses do not grow properly because of poor soil, poor preparation of the soil in the first place, or improper watering, mowing, or fertilizing later.

Often there will be clumps of coarse grasses which will mar the uniformity of a good lawn. If these are seen before the first of June, you may be sure they are not crabgrass. Any treatment effective against these coarse perennial grasses would kill the good grasses, too. So, the only remedy is to dig them out or spot kill them with some chemical. One of the safest methods to use is simply to apply an over-dose of common ammonium sulphate.

CONTROL OF INSECT PESTS

Luckily, there are few insect pests which bother lawns in this country that have ever become very serious. The sod-webworm is occasionally seen but is readily distinguished and eliminated. Grubs sometimes become numerous but are seldom a cause of major damage in this region. The recommended treatment with dieldrin or arsenate of lead will usually control these pests.

Nightcrawlers may become a nuisance in carelessly handled, over-

watered lawns, or they may come in from a neighbor's lawn which is carelessly handled. They may make a lawn sparse, difficult to mow, and dangerous to walk on. Usually the treatment given for the control of crabgrass seed (chlordan, arsenate of lead, and others) will also control nightcrawlers. Dieldrin applied to the soil is also a good remedy. Nightcrawlers actually do little harm, except for the bothersome mounds which they make. They also do little good, as some of the organic gardeners are taught.

Female dogs may often cause dead spots of grass. These will grow over in good time but they can be avoided only by keepings dogs off the lawn. Children will often make paths or tramp out areas around play equipment. Both dogs and children can be trained to respect lawns and gardens, but the best plan is to provide separate areas for them to run and play in.

DISEASE CONTROL

In the last few years much has been published about the increased prevalence of "new" lawn diseases. Much of this information has been misleading and has allowed quacks to prey on the public citizens who have been told only half-truths. Actually, the best treatment for most lawn diseases is really prevention. It is foolish to spend great sums to "cure" a disease unless the cause of the disease is first removed. The spores of many of the dangerous lawn diseases may be found in almost any lawn by a good plant pathologist, yet serious damage may not be done unless other conditions are favorable for the development of the disease.

Fairy ring is a definite disease which is easily identified but not easily controlled. It is a fungus disease often indicated by rings of toadstools, but the

serious damage to the lawn is from the mycelium, which chokes out all other root growth for some time. Over-watering and excessive use of organic matter may encourage fairy ring to start, yet it often persists under dry conditions and in poor soil. If the area affected could be thoroughly saturated with a good fungicide the disease might be cured, but this is difficult to do because of the impervious condition of the soil when the disease is present and because the disease may infect areas a considerable distance from the place where it is apparent. Some materials, such as a detergent, may help to prepare the soil to receive a fungicide. Panogen, fermate, captan, phalthan, and acti-dione are sometimes recommended as controls. There is no known positive cure. A good aerating will often help as much as anything.

The much publicized "foot rot," "melting out," or *Helminthosporium* and associated diseases usually occur where there is persistent, cool damp weather and where the soil has not been properly prepared for planting, has been over-watered, has been improperly fertilized, or has been handled in such a way that the grass roots are not deep. It is seldom serious in a deep-rooted lawn. Panogen, dithane, semesan, captan, and acti-dione are some of the many fungicides which have been used for its control. Iron sulphate has been used with good results.

"Brown patch" or "summer blight" is a similar disease, usually seen in hot, moist weather. Control and treatments are similar to those above. Improved cultural practices will usually accomplish more than simply the application of chemicals to "cure" a disease which wrong handling has caused. Many times the disease has come and gone before it is discovered, and any doctoring then would be wasted.

Snowmold may develop where piles of snow have kept the soil wet and where conditions are favorable for its development. It is debatable whether or not preventive treatment with fungicides is practical. Not allowing snow to accumulate and lie for long periods in these spots may be the best preventive.

Chlorosis is a deficiency disease which may be caused by any condition that prevents a plant from getting the necessary materials from the soil or air. Saturated soil, heavy alkalinity, or undesirable materials in the soil may cause an interference with the formation of chlorophyll in the leaves, causing the leaves to appear yellow. The most common cause of chlorosis in this area is the unavailability of iron in the soil. Often the addition of a small amount of iron sulphate will bring quick results. Iron sulphate may be sprayed on bluegrass at the rate of 4 ounces per 1,000 square feet, with half this rate for bentgrass. Do not apply the compound dry. If this does not give quick results, chelated iron is usually effective.

LAWN REPAIR

When bare spots appear in lawns because of disease, insects, or physical damage, these spots may be reseeded by digging them up and treating as for a new lawn. Dig in first to be sure that these bare spots are not caused by areas of impossible soil. If the cause is impossible soil, remove it before re-seeding. Small spots will often fill-in themselves if the cause is removed and if the surrounding lawn is growing vigorously.

Often there are areas where sod which is growing under a shrub may be removed and used to repair bare spots quickly. Cut this sod to a uniform thickness (usually about 1½ inches) and fit it carefully into the bare areas which have been excavated to the same

depth and the soil underneath loosened up.

Often lawns which have become thin and spotty may be renewed by a treatment of first aerating then fertilizing and watering more thoroughly and less frequently. (Much of the aerating done is ineffective because it is not deep enough and holes are tramped shut too soon. The best results from aeration come when the holes are deep and are filled with a porous material such as sand or peat which will prevent them from closing too soon.) Various ma-

chines and methods have been developed to "bring back" lawns that have become thin, full of weeds, or diseased. These methods may include aerating, raking, and renovating by digging up the accumulated mat of roots under the surface to a depth of 1½ to 2 inches. All of these methods are usually "shot-in-the-arm" treatments which may save a lawn for a short period. They generally must be repeated, periodically, and cannot take the place of improving or replacing the "impossible" soil on which the lawns were originally built.



Exhilarating Science

M. WALTER PESMAN

IF YOU are in danger of thinking that life is dull and "hum-drum," here are two items that sound mighty exciting!

1. John Glenn had to get back to earth and "normalcy" after so many hours. Scientists now are working on new "environments" so space travelers will be less earth-bound. For one thing they are trying to create a "closed ecology" that will be balanced as to oxygen and carbon dioxide in such a way that man will have enough oxygen to breathe and the plants will use his surplus carbon dioxide. The Martin plant has a corps of biologists working on the problem.

Possibly algae will be used for the purpose. There is no telling but that space travelers will also be able to make a meal off of these algae, to take the place of a good steak or a fried egg. The fact is that future man may have to live on more products from the ocean to survive at all.

2. Another low form of life has to do

with antibiotics and viruses. We know that viruses are responsible for aster yellows, tobacco mosaic, and curly-top of sugarbeets. Interestingly enough, viruses also cause the mottled petals of the group of tulips called Rembrandts.

Antibiotics were discovered in 1929 and created a furore in 1940 with the use of penicillin for the control of various diseases. We now have streptomycin, chloromycetin, and aureomycin produced in great quantities. Thus the lowly molds have been put on the throne.

And now, lo and behold, these antibiotics are tried for the control of plant diseases. Streptomycin can be fed to chrysanthemum roots against bacterial wilt; it is also effective against pear blight. Aureomycin prevents formation of crown gall on tomatoes and marigolds. Terramycin, helixin, filipin, and chloramphenicol are being tried on plant diseases. — What next? Who says science is dull?

S. R. DeBoer Park

EDMUND W. WALLACE

S. R. DEBOER, or "Dee" as most of us know him, has again been recognized by the people of Denver for his contribution to the City — this time for his outstanding work in developing its park system. "Dee" became consultant landscape architect and city planner to the City of Denver in 1910, two years after coming to this country from the Netherlands. At that time Denver's 213,000 people had about 1,100 acres of parks, most of which were open pasture. When he resigned his post in 1957, Denver's 500,000 people had about 2,500 acres of park land. In his 47 years with the City, he planned and supervised the development of Denver's major park and parkway system, much of which was accomplished under the administration of Mayor Speer. During this period, he was busy carrying on a private practice as well as being consultant planner for the state of Wyoming and Boulder City, Nevada, U. S. Dept. of Agriculture, National Park Service, and was State Planner for the National Resources Planning Board for New Mexico, Wyoming, and Utah.

He is a Fellow Member of the Amer-

ican Society of Landscape Architects, a life member of the Colorado Society of Engineers, and Member of the Colorado State Planning Board, American Institute of City Planning, and other professional organizations.

It just seemed that a man as busy as this who had devoted so much time, effort, and enthusiasm, not without personal sacrifice, toward developing Denver's world-known park system should be recognized. In March of this year, the City Council did just this in passing the following resolution:

WHEREAS, S. R. DeBoer, rendered distinguished service to the City and County of Denver and the people thereof, and the Council desires to express the respect and admiration of the people of the City and County of Denver for his contribution to the City and County of Denver:

NOW THEREFORE:

BE IT ENACTED BY THE COUNCIL OF THE CITY AND COUNTY OF DENVER: That the 5½-acre site at Harvard Ave. and S. York Street be, and the same is hereby designated, a park, and shall henceforth be named, known, and designated as S. R. DeBoer Park.

To this we all add our personal thanks and appreciation.

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Aa Bb Cc's of

PLANT BREEDING

PART II

DR. MORAS L. SHUBERT

University of Denver

LAST MONTH we talked about the control of heredity by the genes, which are arranged within the structure of the chromosomes. Now we must recall that each inherent trait, such as flower color, leaf shape, tallness, dwarfness, and thousands of others, is governed by pairs of genes located upon paired chromosomes. We also discussed the necessity that there be some degree of variation within a single species before we can do much about producing new varieties by selecting individuals that have new combinations of genes. This month we will examine some of the principles governing combinations and recombinations of genes.

HOW MENDEL TURNED PEAS INTO CUES

In our present complex civilization there are so many details to learn that it is very refreshing, at times, to go back to the simple beginnings of a subject-field such as genetics, in order to become familiar with the basic facts and concepts. Even though many people feel that the experiments of the first scientific investigator of genetics problems, Gregor Mendel, have been overworked, I believe that a study of some of his experiments and of the conclusions he reached provide the proper beginning. For remember that he was working with practically no scientific laboratory equipment and not even an understanding of cell structure, yet

by the orderly simplicity of his experiments and the painstaking attention to accurate observation he was able to obtain results and publish conclusions that were 40 years ahead of the times. The point that I wish to emphasize is that many of us are over-impressed by our fancy laboratory equipment and rapid machine calculators to the point that we forget that much can still be accomplished by a person who is observant enough to make new discoveries in his own garden.

Mendel became interested in the kinds of variation displayed by several varieties of garden peas that were available in the 1850's. He observed that there were seven different traits which showed clear-cut differences; that is, one variant showed a particular trait but the other variant did not show it at all or else had a somewhat opposite trait. There were no "in-between" characteristics. Of the seven traits he studied the following will provide good examples: One variety was a tall vine but the variant was a dwarf. One variety had seeds which were yellow when ripe; its variant, green seeds. Variation in seed shape was a smooth round seed versus a wrinkled type. The other variations with which he worked involved such things as pod color, pod shape, and position of flowers on the stem. Incidentally, many people are

surprised to learn that there are good English translations of Mendel's paper, published in 1865, in our libraries.

Perhaps the easiest of Mendel's experiments to understand is the one he designated "Experiment 7." This dealt with the factor for stem height, and he used pure-breeding tall plants and pure-breeding dwarf plants as parents for cross-breeding. First he would remove the stamens from a flower before they had time to shed their pollen then transfer pollen from the other parent to the stigma of the flower. He made cross-pollination from tall to dwarf and from dwarf to tall to learn whether or not the parent producing the seed had any effect upon the kind of seed formed. He carefully collected the ripe seeds and planted them to see what kinds of plants he would get from this "hybridization." The result was that every plant that grew from these seeds grew tall! It would appear that the factor for dwarfness was completely obliterated. Mendel said that the factor for tallness was *dominant* and that the factor for dwarfing was *recessive*. It should be mentioned here that the products of the cross between the two pure lines were designated F_1 , for "first filial generation." You may have purchased hybrid garden seed with the words " F_1 -hybrid" on the label, so this is the origin of the term.

Since his hybrids showed none of the dwarf trait, the question that needed to be answered was this: "Is the hidden factor still present, and if so, can it be made to reappear?" To solve this problem he made sure that all of the flowers on his F_1 plants were self-pollinated, then he planted the seed produced from them. He harvested 1,064 seeds and from them found that 787 plants grew tall, but 277 were dwarfs. This meant that there were about three tall plants to every single dwarf one, a ratio of

3 to 1. Now if we analyze these results we will see how the simplest form of genetic control operates. Going back to the pure-line parents, we see that each one contributed one gene that governed stem length to the seed that was formed, so if we use the letter "T" for the dominant gene (tall) and the letter "t" for the recessive gene (dwarf), we can say that the F_1 seedlings, each and every one, had the pair of genes, Tt. Since the gene T is dominant we find that all the progeny are tall. If we next self-pollinate flowers from these plants, we can see that the kinds of pollen produced will be either T or t, and the same is also true for the kinds of ovules (unfertilized seeds), which will also be either T or t. When we combine these, as would happen in self-pollination, we get the following:

Kinds of pollen:		T	t
Kinds of ovules:	T	TT	Tt
	t	Tt	tt

Since the gene T is completely dominant, we can see that there are three chances for a pollen-ovule combination to produce a seed containing at least one T to every chance of getting only tt. The self-pollinated F_1 produces F_2 seeds, so this is commonly called the " F_2 monohybrid ratio" (3:1).

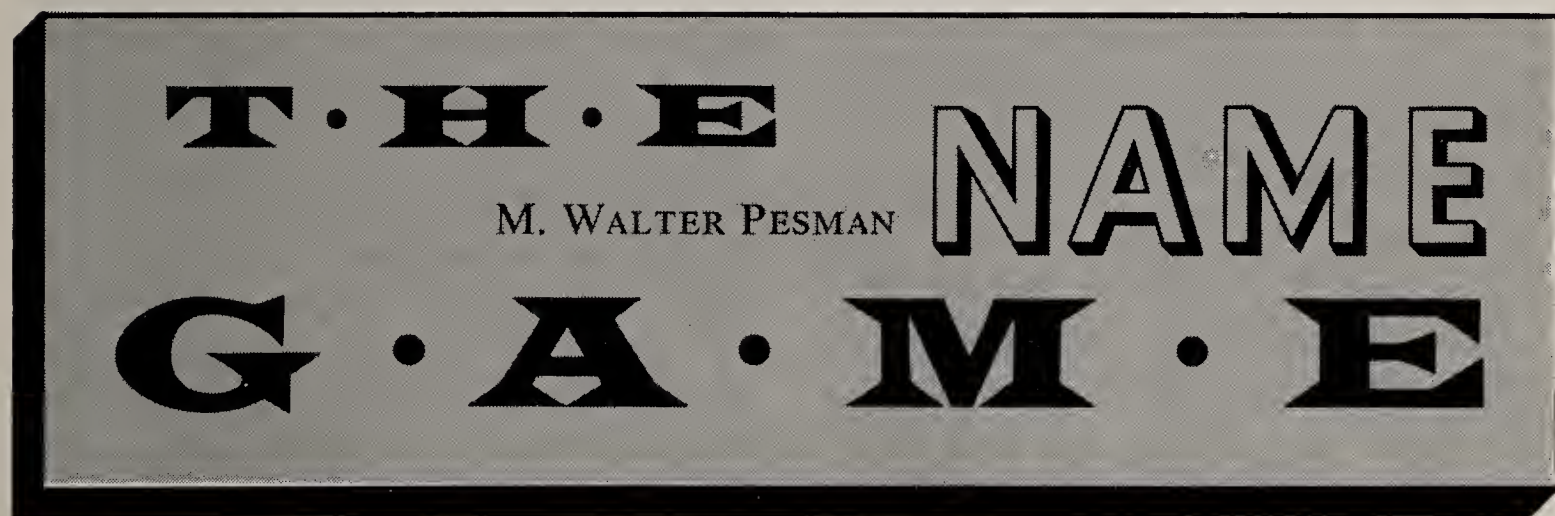
It is easy to see that the progeny that carry genes TT and tt are again pure-line plants and will continue to produce progeny like themselves at least for this trait, if they are self-pollinated. The "hybrid-tall," Tt plants, will produce tall and dwarf progeny in the ration of 3 to 1 whenever their seed is the result of self-pollination. From this, you can see how hopeless it would be to try to produce new varieties if the genes governing the traits you were seeking to improve were all "pure."

We can learn a lot more about the

basic principles of genetics if we review another of Mendel's experiments where he studied the inheritance of two different traits simultaneously. For this he chose a variety of peas that had round seed shape (RR) and yellow seed color (YY) and crossed them with plants that were pure-breeding for wrinkled seed shape (rr for non-round) and green seed color (yy for non-yellow). We can see that all of the F₁ seed would contain genes from each parent, so would be described genetically as, RrYy. (Notice that we keep symbols for gene pairs together.) What kind of F₂ seeds can be expected if we plant these hybrid round-yellow seeds? It is necessary for us to figure out what kinds of pollen and ovules will be formed, so we keep this rule in mind: Every pollen grain and every ovule will contain in its sex-nucleus only one member of each of the gene pairs, but there is an equal chance for each kind of gene to be paired with each of the other kinds. Therefore, we can see that these are the possible combinations:

RY, Ry, rY, and ry. With four kinds of pollen and four kinds of eggs in the ovules we can get 16 kinds of combinations.

Here is a homework assignment to be completed before the next issue: Make a 16 square checkerboard by arranging four vertical columns to cross four horizontal rows. List the kinds of pollen in this order from left to right across the top: RY - Ry - rY - ry, and then list the kinds of ovules in the same order from top down along the left side. Each square then is filled in by combining the letters at the top and sides where they intersect. For example, the upper right square should contain the letters RrYy and the bottom right should be rryy. Now fill in all of the squares and see what proportion of seeds carry the proper genes for each of these kinds of seed: Round-Yellow, Round-Green, Wrinkled-Yellow, Wrinkled-Green. You can count them up and see what ratio you get. The answer will be given next month.



The sun, "helios," rates high in plant names:

Helianthus — literally sunflower.

Helianthemum—another form of flower, called sunrose.

Heliotropium — turning to the sun.

Helichrysum — combined form of sun and gold, an everlasting.

Heliopsis — combining sun with appearance, a hardy, sturdy perennial.

Heliocarpus — a Mexican tree with sun-like fruit, not hardy here.

P.S. *Pachistima* is a pretty, low, native evergreen. What does its Latin name tell about it? See next issue.

Hemerocallis

F. EDGAR RICE

Mr. Rice of Bartlesville, Oklahoma, is a past president of the American Hemerocallis Society. His daylily gardens have been pictured in garden magazines and books. He frequently visits his son, Robert B. Rice, who grows and tests his father's favorite flower at 6820 S. Steele St., Littleton.

HEMEROCALLIS, the exquisite, glamorized lemon-lily of yesteryear, is one of the most popular wind-and-weather proof perennials.

In bloom its color ranges from almost white to deep yellow, pink, deep red, reddish purple, and even brown. Pinks and reds predominate. Newer varieties boast inbred fading resistance, a prime criterion in Colorado. Out of bloom the plant affords graceful clumps of foliage essential to a well-planned border.

In contrast to the original daylilies that blossomed for only a day, today's counterpart may bloom for several days, for extended periods, or after a short rest may flower again, sometimes until frost. Bloom may extend from mid-June to mid-September with careful selection of varieties.

Although their height varies from 8-inch dwarfs to giant 6 footers, most popular hemerocallis varieties fall in the 24- to 40-inch group.

"Hems" may be planted almost any time, but they prefer spring planting in this area. With mulching they will survive fall planting and the —25 de-

gree temperatures experienced last winter. (Evergreen varieties, extremely popular in southern regions, must be treated as deciduous plants in Colorado.) Plant daylilies in ordinary garden soil to which $\frac{1}{3}$ mountain peat has been added. They require at least half a day of full sun; some varieties do better in partial shade than others. Fertilize in early spring with a complete fertilizer, such as 5-10-5.

Although watering is a must for fine flowers, the plants will thrive with a thorough soaking every two weeks. Relatively pest free they are occasionally attacked by red spider mites.

Some favorites are listed below. Numbers show rating in the national poll, letters give colors.

1. Frances Fay, Y; 2. Fairy Wings, Y; 4. Salmon Sheen, S; 11. Atlas, Y; 12. Evelyn Claar, P; 13. War Eagle, R; 20. Cibola, M (melon); 23. President Rice, Y; 28. Ringlets, Y; 32. Painted Lady, O; 33. Pink Orchid, P; 35. Neyron Rose, R (rose); 50. Colonial Dame, Y; and 75. Marguerite Fuller, Y.

Consistent performers in addition to those mentioned above are Magic Dawn, rose-pink with greenish yellow throat; Nina Rebmen, amber-yellow with faint pink edgings and center bands; Mabel Fuller, luminous red with dark yellow throat; Garnet Robe, velvety red with yellow throat.

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PETE

Ponders



Dear Petie,

When is the proper time to multiply, or divide, creeping phlox?

PROBLEMS

Dear Problems,

To multiply you divide — phlox, that is.

Phlox subulata, the pretty blue, white, and magenta creepers we enjoy each spring, should be divided after August 15, according to Big Bill Lucking. If the clump is large simply cut through the plant and attached soil in big wedges and replant.

You may break off segments and pot them in 2-inch pots if you have a cold-frame or greenhouse. My chief source of new plants is a healthy specimen growing over a flagstone walk. I just break off nice chunks and insert two or three where I want a plant to grow. These turn brown for the winter, but it's amazing the percentage that greens up and produces a few blooms by spring. Big Bill grins, "That's as good a way as any."

Dear Pete,

My new summer cotton is a print of herbs and gourmet foods. Printed in fine script on both front sides of the blouse is a menu beginning with Bar le Duc. Folks I encounter read the menu and promptly inquire, "But what is Bar le Duc?"

Having worked with plants a goodly

part of my short lifetime I'm embarrassed to admit, "I don't know." You seem like a worldly woman, do you know?

SHY VI

Dear Violet,

Not worldly, dear, just earthbound.

Bar le Duc is a seedless jam named for a town in northern France. Some receipes use currants or gooseberries, sugar, and honey. Others suggest currants, cherries, and oranges as the ingredients, my sweet.



Exotics of Colorado...

The PERUVIAN DAFFODIL

DR. HELEN MARSH ZEINER

University of Denver

FROM Peru and Bolivia comes a lovely tender bulbous plant which can be grown successfully in the Denver area. This is *Hymenocallis calathina* (or *Ismene calathina*), commonly known as the Peruvian daffodil or the basket flower. Like the well-known daffodil of the genus *Narcissus*, the Peruvian daffodil belongs to the amaryllis family, Amaryllidaceae. The two flowers resemble each other very little, however, except that they both have a conspicuous crown or corolla.

Peruvian daffodil bears from two to five large, very fragrant, white flowers in a flat-topped cluster. Each flower has a striking funnel-shaped crown with six rounded, fringed lobes, set off by six elongated strap-like perianth segments. The whole makes an unusual graceful flower of striking beauty — sure to be a conversation piece in any garden.

Although classed as a tender bulb, Peruvian daffodil can be grown without much difficulty. Since it is tender, bulbs should not be set out until danger of frost is past. They will grow rapidly to maturity, putting out large, strap-like leaves soon followed by the bloom. Peruvian daffodil likes a well-drained loamy soil and should receive full sun at least part of the day. Depth of

planting varies with size of the bulb — about 6 to 8 inches deep for large bulbs, less for small bulbs. The bulbs must be taken up in the autumn, no later than the first frost. Care must be taken in digging since the bulbs put out a number of fleshy roots which should not be broken off. (Some breakage is inevitable, but be as careful as possible and try to save most of the roots.) Air dry the bulbs for a few days, then store them in a cool place where there is no danger of freezing. A basement fruit cellar is ideal. Ventilated plastic vegetable bags or mesh vegetable bags are satisfactory containers. Plants can be propagated by saving and planting the offsets from the large bulbs. In a year or two these will reach blooming size.

Peruvian daffodil can also be used as a pot plant indoors. It normally blooms in summer and rests in winter and is most successful when handled to permit this schedule of blooming.

Since Peruvian daffodil is not a well-known and popular bulb, it may be necessary to try several sources to obtain it. Local tradesmen will probably order the bulbs on request if they are not kept in stock. Once obtained, the bulbs can be kept indefinitely and will give many seasons of beautiful bloom. Let's see more in the Denver area!

MARSHALL NURSERIES

Better Built Trees — Landscaping with Personality

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IN YOUR GARDEN

Associate Professor, Department of Botany and Plant Pathology,
Colorado State University, Fort Collins, Colo.

A LETTER TO OUR newspaper editor closed with, "So, you mothers, let's get rid of every castor bean plant right now before it is too late, before your child or mine gets poisoned!"

But I for one, shall not join the crusade. The castor bean or castor oil bean and the plant are indeed poisonous, but they can harm no one unless the toxalbumin (ricin) gets directly into the blood stream by way of some lesion. If it does enter, then its effect is similar to that of some snake venoms. But if one's membranes are perfectly sound, eating the bean or any other plant part causes nothing more serious than a laxative or purgative effect, depending on how much has been consumed.

Let me assure everyone right now, though, that castor oil is entirely free of the toxin. The pressing and other processing give us a product which is completely harmless and is indeed very useful.

No, I won't join the crusade, because once in it, I would have to follow through and rob your garden of many other delightful plants.

Who would give up larkspur or foxglove, autumn crocus or lily-of-the-valley, and in regions milder than our own, oleander or poinsettia? These are only a few of the plants which are more or less poisonous but generally cause no one any harm. Even European hemlock, *Conium maculatum*, unwanted by most of us because it is so weedy or so mousy in odor, is still cherished in some garden or other. I once saw it used in Burlington, Colorado, as a living screen, 6 to 8 feet tall, to hide an embarrassingly littered back yard. I know of no harm which came from this screen, though the plant has enough poison in it to make it useful for executioners. It was with this that the Greek state hushed its gadfly Socrates by sentencing him to have tea which was brewed from the leaves and possibly flowers and seeds. Today, we occasionally see a headline stating that a child has been poisoned by *Conium*, but the news item itself often fails to give full support to the headline. Cattle are known to graze the more tender stems and leaves, but apparently not extensively, for no bad effects have been reported.

It is somewhat of a paradox that poisonous plants which in the past were important in the physicians' garden have today become esteemed garden plants cherished for beauty of blossom or of foliage only. A hundred years or so ago many a doctor, even in this country, either preferred to grow some of his own drugs or was compelled to produce them when no ready supply was available. Some of these men became highly competent botanists. Naturally then, when our government expeditions, sent to explore the Great West, signed on a doctor,

they preferred a botanizing one. Often doctoring duties were light, hence the man could justify his keep by collecting, describing, even identifying some of the plants which he then brought back for the professionals to pore over. Many of our plants bear at least a species name honoring one or another doctor-botanist.

Possibly foxglove, *Digitalis*, a physician's or pharmacist's plant even today, is one of your favorites. The drug source as cultivated in Europe is largely *D. lanata*, while we grow the more beautiful-flowered *D. purpurea* mostly for ornament. The other species known seem not to be common in our gardens. Foxglove, originally a folk remedy for dropsy, has become known through closer investigation for its regulatory effect on the heart. But as a folk remedy it has poisoned many people and even today causes occasional "accidents." The dosage must be carefully regulated as must also the frequency of administration.

Of the larkspurs, we most likely grow *Delphinium grandiflorum* and varieties like it, with massive bright to deep blue inflorescences. These are stately plants, 5 to 6 feet tall under favorable conditions. In our mountainous areas, as for example on the Flattops north of Rifle, Colorado, the similar native, *D. barbeyi*, often causes considerable loss of livestock, while in the foothills and occasionally in the adjacent plains, the low forms such as *D. geyeri* and *D. nelsoni* are disliked for their poisonous qualities. Some of the cultivated species are known to be toxic, yet we seldom hear of poisoning resulting from their presence. *D. staphisagria*, a common garden plant in Central Europe, contains a substance in the seeds which is used to drive vermin from bodies of both man and beast. As folk remedies, several lark-

spurs have been used rather extensively, as vermifuge, emetic, antineuralgic, and antispasmodic. Overdosage is reported to have caused fatalities.

In its native European environment, autumn crocus, *Colchicum autumnale*, is a pest in many meadows. Generally it is avoided by livestock, but when that is impossible, as when the plant occurs in chopped hay or when greens-hungry creatures graze the rapidly growing leaves in spring, severe poisoning and frequently death results. All parts of the plant, but especially the bulb, contain the very poisonous alkaloid colchicine. This is the chemical used experimentally to induce changes in the genes of plants. The colchicine content varies from season to season but is always high in the bulb.

Lily-of-the-valley, *Convallaria majalis*, with its pure white nodding bells and exquisite fragrance so difficult to trace to the source, seems too fine to harbor any poison. But it does contain a toxic substance, and from Pennsylvania comes a report that chickens have been poisoned from eating the deteriorating flowers. Other reports have it that animals grazing on lawns and in areas to which the plant has escaped have become very sick from eating leaves and flower stalks. Yet birds may feed on the bright red berries, which mature occasionally, and apparently suffer no bad effects.

Does anyone in our latitude still grow oleander, *Nerium oleander*, in tubs or half barrels, laboriously dragging the plant in its bulky container to the basement for winter and again out to the lawn for summer? The sturdy shrub with its slender, glossy leaves and pretty red, pink, or white flowers is sightly enough to repay such labor, but it should be treated with caution. The Sanskrit name for the plant is "horse-killer," while the Italian and

Arabian names mean "ass-killer." In Arizona, oleander is reported to have killed horses which ate the foliage, and in Hawaii, it is said, "animal poisoning is not rare." Several human deaths have occurred from eating meat spitted on a stick of oleander for cooking over an open fire. But masses of oleander are used on the University of Arizona campus and along fences, as well as in center parkings in Arizona, California, and Texas, with apparently no harmful results at all.

Poinsettia is a very popular plant for Christmas and for yard planting in California. It is rightfully so, for its bright red top foliage against the green of other leaves supplies the color we prefer at the holiday season. Poinsettia, though, is charged with having caused the death of a 2-year-old child who ate but a single leaf, and some people report that the juice is irritating to their skin.

The juice of many other plants of the euphorbia family is rather caustic and may also cause other poisoning. In folk medicine, euphorbias have been used as laxatives, emetics, and counter-irritants. In homeopathy they are used for treating inflammations of mucous membranes. Two plants of the family have been introduced to us from Europe where they are used in garden plantings. We seldom use them as such, but they have nevertheless escaped from cultivation.

Cypress spurge, *Euphorbia cyparissias* has spread rather widely in the northeastern states, and in Kansas dense stands of it are rather common in old, neglected cemeteries. Leafy spurge, *E. esula*, is frequently encountered in some areas of Colorado, principally as roadside and field-edge patches. Both these spurges occupy additional area rather rapidly by sending rhizomes in every direction. In

Central Europe they are now regarded as rather dangerous, probably because of excessive use as a home remedy. The seeds, especially of leafy spurge, are self administered as a laxative and cathartic. Overdosing has caused serious illness and even death. Here, where we rely more upon patent medicines and the druggist, we are not inclined to use unprocessed plant materials as medicine. The spurges have, therefore, not received much attention except as weeds and are not considered as being dangerous.

Another euphorbia, snow-on-the-mountain, *E. marginata*, is an annual which occasionally appears in our gardens, perhaps by accident. More commonly we find it in extensive stands along roadsides of the plains region and in disturbed soil, even in pastures. Its white-margined floral leaves make it a rather ornamental plant, and the nectar readily attracts bees. But the honey produced from it is acrid and has caused inflammation of mouth and throat and even serious illness.

Some of the euphorbias which are grown as potted plants are often mistakenly called cacti. Their stems may be beset with sharp spines and may remain leafless for long periods of time. Similar and larger forms are common to the arid regions of North Africa where they are caused to produce resinous materials by wounding the stem. These exudates have been used as arrow poisons and in medicine. Today, however, they are valued chiefly as an ingredient in special paints applied to the hulls of ships to reduce the rate of fouling.

A listing of favored house, garden, and yard plants which are somewhat poisonous would be long. It would include poppy, certain plums and cherries, lupines, iris, primulas, lobelias, aconitum, Christmas rose (*Helleborus*

niger), star-of-Bethlehem (*Ornithogalum*), Jerusalem cherry (*Solanum pseudocapsicum*), *Nicotiana* and other solanaceous plants, *Narcissus*, even species of lettuce, junipers, and many others. But there is no more need of giving up these than of refusing to use automobiles because so many people are maimed or killed while using them. Very few of our plants cause poisoning on mere contact. Mostly, some plant part must be eaten, generally in quantity, or tissues must become broken, thus releasing caustic juices or latex, before any bad effects result. A goodly number of poisoning "accidents" recorded result from carelessness or ignorance, as when greens for eating are gathered from wild plants or from misidentified plants or when mushrooms are gathered by inexperienced persons. Even our very toxic poison ivy, *Rhus radicans*, does little harm as long as it is treated with respect. In one of Louisville's (Kentucky) beautifully wooded

parks, the trunks of many trees are clothed with so massive a growth of the viny form that the plants are undoubtedly decades old. No one seems to be concerned about the ivy, any more than about the shrubby low form which one comes upon very frequently in our Rist and Big Thompson Canyons. It is startling, of course, to see a dry winter bouquet of nothing more than ivy twigs and ripened berries used for decoration in the home. But really amazing is to find that the person who gathered and arranged the material may not have suffered with itching, blistered, and oozing skin. One must conclude that the hardiness of pioneers we love to cite so often has not gone from us. Or is it that someone's luck is unusually fine! Better insurance is to be knowing about one's plants, to be properly respectful of their potential. These attributes seem to be common, for rarely do we hear of poisoning having been caused by our garden plants.



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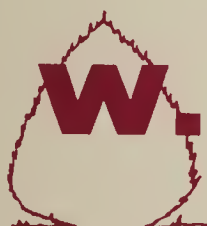
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The Green Thumb

A Magazine for Rocky Mountain Gardeners

AUGUST 1962

25 CENTS



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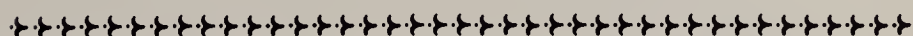
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WATERLILIES



Notes and Notices



A NOTE OF THANKS — The Terrace and Garden Tour Committee wishes to express its appreciation to the Red Owl Stores, Inc., for the donation of paper cups, tea, and frozen lemonade concentrate for the Tour which took place June 27. This was a most generous gesture and did much to revive the weary and thirsty travelers on the Tour.



PICTURES — Members of Denver Botanic Gardens are requested to send to the editor of *The Green Thumb* extra snapshots of plants, garden scenes, etc., for a permanent file of photographs to be used for illustrations in *The Green Thumb*.



POTENTIAL ADVERTISERS — Advertising in *The Green Thumb* is a good business investment. The rates are low and your message can reach the market you wish to explore. Consider these rates: ½-page ad in one issue, \$30.00; ½-page ad in five issues, \$27.00, each issue; ½-page ad in ten issues, \$24.00, each issue.



MEMBERSHIP UNLIMITED — If you feel that membership in Denver Botanic Gardens can be of service to you, please send your name and address, along with your check (Regular membership, \$5.00), to Botanic Gardens House, 909 York Street, Denver 6, Colorado.

Your membership in Denver Botanic Gardens entitles you to these things:

- 1) *The Green Thumb*, Colorado's only garden magazine, written for the Rocky Mountain region by experts in their fields;
- 2) use of Botanic Gardens House for flower shows, classes, study groups, and other meetings pertaining to horticulture or to botany;
- 3) use of the Helen K. Fowler Library at Botanic Gardens House;
- 4) use of the Kathryn Kalmbach Herbarium at Botanic Gardens House;
- 5) answers to your gardening questions on flowers, shrubs, trees, and lawns;
- 6) the benefits of the research work performed by the Botanic Gardens' staff.

Your membership also benefits your state, your city, and your community.



HATS OFF — Sincere thanks from Denver Botanic Gardens are extended to the following people:

- 1) the diligent members of the Park Hill Garden Club who have been contributing a half day each week to volunteer work at Botanic Gardens House;
- 2) Mrs. Arthur Hellriegel for her volunteer work each week in the Helen K. Fowler Library;
- 3) Mrs. Henry J. Conrad, whose love for roses is the chief reason why we have such outstandingly lovely blooms in the rose beds at City Park and 909 York Street.

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m., KLZ Radio.

The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent.

Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7.

The Weekend Gardener, Herbert Gundell.

AT BOTANIC GARDENS HOUSE

AUGUST

- 1—Wednesday, 7:30 p.m., Botany Club
- 2—Thursday, 7:45 p.m., Orchid Society
- 7—Tuesday, Mountain View Garden Club Luncheon Meeting
- 10—Friday, 10:00 a.m., *The Green Thumb* Editorial Committee
7:30 p.m., Landscape Contractors
- 13—Monday, 10:00 a.m., Judges' Council
- 14—Tuesday, Herbarium Study Group
- 15—Wednesday, 9:30 a.m., Fun With Flowers

- 22—Wednesday, 7:30 p.m., Landscape Contractors
- 23—Thursday, 1:00 p.m., Ikebana International Flower Arranging Class
- 26—Sunday, 2:00 p.m., Colorado Cactophiles
- 27}—Colorado Federation of Garden Clubs
- 28} Fall Flower Show School,
- 29} Mrs. Seastone

SEPTEMBER

- 5—Wednesday, 10:00 a.m., Colorado Federation of Garden Clubs State Board Meeting
- 6—Thursday, 7:45 p.m., Orchid Society

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Use, Transplanting, Coniferous and Care of Evergreens

CHARLES M. DRAGE

Extension Horticulturist

Colorado State University, Fort Collins, Colorado

THE CONIFERS or narrowleaf evergreens include a large number of tree and shrub forms admirably suited to landscape in Colorado. They can add much to the picturesque beauty of the home grounds if they are rightly placed and cared for properly. Their foliage effects in summer are good, but their pleasing touch of green to the winter picture, when other plants are naked, is a real contribution.

The most widely planted kinds are junipers, followed by pines, spruces, and firs. All genera are native to Colorado and each has many species and named horticultural varieties. Specific information on choice of kind for a particular location is best secured from a local source. The local nurseryman, landscape architect, extension agent, grounds superintendent, garden club member, or others familiar with the locality and kinds of plants adapted can be of material help in selecting the most suitable kind or variety.

The best use of conifers is in borders of the grounds or near buildings where they form backgrounds for other plant materials. The upright or tall forms may be used for screens, windbreaks, hedges in border or foundation plantings, or as individual specimens. Specimen trees as a rule should not be used freely except in large open areas where they can be given plenty of room for perfect development and where they will not interfere with views or fill spaces which should be devoted to open stretches of grass. They should be placed at a sufficient distance from other trees so they can spread out naturally. They should not be pruned except when necessary to remove or correct irregularities in growth. On extensive grounds, the conifers appear to best advantage when planted in groups or when massed, where it is desirable to divide areas or screen views. The presence of evergreens in the front lawn where they obstruct the view from windows or where they cast a dense shade throughout the year is against the best principles of landscaping.

The trailing or prostrate forms are more generally used in foundation or border plantings. The attempt to use narrowleaf evergreens entirely in the foundation planting makes for a sameness and monotony of arrangement that cannot be considered good landscape effect.

TRANSPLANTING

Plants moved long distances or plants held or stored under unfavorable conditions are frequently half-dead and not suitable for planting at the time they are purchased. These plants may survive one or more seasons then die completely.

The best time to transplant evergreens begins in the spring when deciduous trees and shrubs are just starting to leaf and continues for about a month.

A second good time is in late summer and early fall when again root growth starts rapidly. Evergreens can be moved at almost any time during the year but there are hazards when they are moved during the hot, dry summer months when roots establish slowly and have difficulty replacing the moisture lost from the foliage by transpiration. Regardless of the time of transplanting, vigorous, healthy plants; special care in transplanting; and proper watering later are essentials for success.

Evergreens, except seedlings or very small sizes, are usually transplanted with a "ball" of soil. The ball must hold the root intact; roots exposed to air cannot function properly later and the plant will probably die. Plants sold as "B and B" mean that burlap or some other fabric is used to hold the soil intact. Container-grown or "canned" plants are becoming increasingly popular, particularly with smaller plants. In all instances plants must be handled carefully to avoid cracking the ball which will loosen the contact of the roots with the soil and expose them to the air. When plants are received, if conditions permit, they should be set out without delay. If it is necessary to hold them for a few days, place them in a shady location protected from the wind. Keep the ball moist, and it is helpful to spray or sprinkle the tops daily.

The planting hole should be a foot or more wider and a foot or more deeper than the ball. Unless the soil is very good it should be replaced with a fertile loam for the backfill. A good backfill soil can be made by mixing 30-40% peatmoss with 60-70% good garden loam. A mound of backfill soil is placed in the hole and the ball set on this soil. Adjust the plant so that it stands firmly at about the same depth

it grew in the nursery. When heavy paper, canvas, or other impervious material has been used for wrapping, this must be cut away after the ball is in place. It is not necessary to remove burlap.

In backfilling, the earth must be firmed by tamping to close air spaces. When the hole is three-fourths filled, water should be used to settle the fresh soil and make still closer contact with the ball. Perhaps the hole will need to be filled with water several times. In finishing, it is desirable to leave a shallow depression around the stem to accommodate future watering.

The application of fertilizers to newly set plants is not often necessary or desirable.

WATERING

The abundant foliage of evergreens transpires large quantities of water. The limited root system of newly transplanted plants makes it necessary to keep the soil constantly moist throughout the first season. This means a thorough watering every ten days or two weeks. Too much water or poor drainage can result in a sodden condition.

When coniferous evergreens are well established, the second or third year, they are quite drought resistant and frequently do not require supplemental water beyond that applied to the grass and other plants in the yard. One important exception exists. When the leaves fall from the deciduous plants and we cease to water, conifers may suffer because they continue to transpire. It frequently is necessary, one or more times during the winter, to water conifers. There is no harm in watering during the winter but water should not freeze on the foliage. Generally speaking, if the soil takes water, it is needed.

During the growing season it is help-

ful to syringe or wash down conifers frequently, perhaps once a week. Use a strong stream of water and thoroughly wash the plants. This should be done in the evening or on a cloudy day. Small droplets of water on the leaves can act like a lens and, in bright sunshine, burning can result. The regular drenching is quite effective in preventing serious buildups of harmful insects.

FERTILIZING

Conifers grown in lawn and garden areas in Colorado soils seldom require special feeding to maintain a moderate, healthy growth. Excessive growth caused by over-feeding can be harmful. In most instances the failure of plants to thrive is caused by things other than the lack of plant nutrients. Exposure of plants to strong winds, reflected light, too much or too little water, poor drainage, deep shade, or overcrowding may all contribute to an unhealthy appearance.

One of the most common defects in the soil of residential areas is the lack of organic matter, the residue from decay of plant tissues. Plants will benefit if mulched with compost over the root areas. The needles or leaves that fall from the plants themselves are beneficial if allowed to remain under the plants. Fresh manure should never be used in fertilizing evergreens.

When soils are known to lack plant nutrients and when organic materials are not available or are objectionable, chemical fertilizers can be used to advantage. A complete fertilizer similar to a 10-8-6 or 10-6-4 has been used with good results for evergreens. It can be used at a rate of 1 lb. per inch of trunk diameter on older trees or $\frac{1}{4}$ to $\frac{1}{2}$ lb. per foot of height on young trees. A standard method of application is to make holes with an auger or punch bar at intervals of 18

inches in concentric circles. Start the circles a foot or two from the trunk and extend them beyond the tips of the branches. The proper amount of fertilizer for the tree is distributed equally into the holes and then covered with soil.

In recent years it has been noted that occasionally a conifer shows symptoms of iron chlorosis. The foliage, in the beginning stages, turns light green to yellow in color but otherwise appears healthy. Iron chlorosis is the lack of available iron and most often occurs when the soils are heavy and when salts are high. All chlorosis is not caused by lack of iron, but when chlorosis occurs the use of a soluble iron sometimes corrects the condition. Use ferrous iron sulfate, or "copperas," at the rate of 1 lb. to 10 square feet of area occupied by the roots. Use the hole method for applying as suggested for chemical fertilizers. Chelated iron, available at garden supply stores, may also be used according to directions on the container.

PRUNING

To cut off the lower branches of any coniferous evergreen is a serious mistake because it results in an artificial form much less beautiful than a tree with branches to the base. The reason or need for pruning conifers is primarily the result of improper selection for a particular location. A secondary reason is the removal of dead limbs, the result of storm or other mechanical or insect injury. Pruning is also done to establish new leaders or to thicken the foliage. Most pruning is necessary in order to confine plants to a particular location. In most instances the natural shape of a plant is desirable. Too often homeowners neglect "pruning to confine" until too late. It must be remembered that few conifers carry dormant buds on limbs

back of the foliage area. Cuts made back of the foliage area usually result in a completely dead limb because new growth will not appear later. When conifers are neglected until they are too large and pruning must be severe, it is often more satisfactory to replace rather than attempt to restore them. Frequent examples are upright conifers in the foundation planting and spruces in the front yard of a narrow lot. Pruning should start early in the life of upright junipers in the foundation planting. Proper pruning, started early, can result in a long life for the plant without having it grow out of bounds. Pines, spruces, and others that grow only one layer of branches yearly are not well suited to pruning to a limited space; they should be permitted to grow to natural shape.

The time to prune conifers is not as important as it is with many other plants. The best time to prune the fine-leaved conifers like junipers is just as the new growth is completed in late spring or early summer. Pruning at this time has the greatest dwarfing effect. The clipping or shearing can remove almost all of the new growth. Shear only those tips that grow beyond the outline of the plant. Prostrate junipers are often sheared to a pre-determined formal shape. In many instances this formal pruning is in conflict with the natural shapes allowed the deciduous plants in the same landscape. This line of reasoning does not apply to the upright types if the natural outline is followed. Prostrate or trailing forms of junipers allowed to grow to a natural shape frequently send forth one or more ambitious branches that may interfere or destroy shape. These branches can be removed back to a lateral without injury to the plant or its appearance.

Very little pruning should be neces-

sary with the pines, spruces, and firs. They grow to a more definite shape than do the junipers and have fewer side branches. They may be kept smaller and made more dense by pinching out the buds at the tips of the branches. This may be done before growth starts in the spring. Or, the soft candle-like new shoots can be pinched or clipped back early in the summer and before the new leaves have developed fully. Sometimes two or more leader branches will develop in a specimen tree. The symmetry of such a tree can be enhanced by cutting off the terminal shoots of the unwanted leaders. Sometimes a storm will break a terminal leader. When this occurs, a lateral can be selected and, by the use of splints, tied to the stub of the lost leader. This lateral branch can be trained to an upright position.

UNHEALTHY CONDITIONS

The natural and normal process of leaf fall from conifers is sometimes mistaken for an unhealthy condition. The persistence of the foliage on evergreens varies greatly among the different kinds. On the arborvitae, for example, the innermost leaves turn brown and fall late in the summer of their second year. On many other kinds the leaves last to the end of their third year, and on a few, they may persist for five or six years.

Dog injury which kills the foliage is quite common, especially with spreading and semi-spreading types. There are several commercial products on the market which are designed to repel dogs. Nicotine sulfate acts as a repellent and likelihood of injury is greatly reduced if plants are sprayed weekly. Sometimes, especially when the plants are young and small, low ornamental fences are the most practical solution.

Climate, particularly in the winter,

is the most frequent cause of unhealthy conditions. Nearly all conifers are subject to winter injury caused by drying winds during periods of bright sunshine and unseasonably warm weather in late winter when the soil is still frozen. The resistance of the trees to winter injury depends upon several factors, such as hardiness in a particular locality and exposure to prevailing winds and to sunlight; sunlight can be intensified by reflection, particularly from a white surface. Yews are so susceptible that few are grown in Colorado and arborvitae seldom are recommended.

The cause of this common type of winter injury is drying of leaf tissues. High winds, sunshine, and unseasonably warm weather combine and tremendous quantities of water are evaporated from the leaves. The roots are unable to replace the water lost, particularly when the soil is frozen. All or part of the needles become tan, red, or brown. In severe cases young twigs, leaders, or the whole plant may be killed. The symptoms may appear any time from late winter to midsummer. Bark may be killed in patches or streaks. The dead bark may separate from the wood. Cankers may form. Young plants that turn brown and die suddenly in midsummer may have suffered from these conditions.

Low temperatures can kill both leaves and bark. Varieties, growing at the limit of their range, arborvitae, for example, may not be damaged for many years but may be killed when temperatures drop below normal. Sometimes freeze injury will occur in

late winter or early spring after trees have broken winter dormancy.

Winter injury can sometimes be avoided by refraining from planting the less-adapted kinds. Most evergreens have roots near the surface; avoid deep cultivation. Mulches of leaf-mold, compost, or peat around the base of the trees during the winter months will aid in conserving the soil moisture and in preventing deep freezing of the soil. It is advisable to soak the soil thoroughly before it freezes and, when winters are dry, winter watering may be necessary. Trees that have been overfertilized, particularly with nitrogen, are more susceptible to winter injury than trees allowed to grow more normally.

Spraying in midwinter or late winter with one of the recently developed anti-wilting formulations that reduce loss of water from the leaves may also help prevent winter drying. The anti-wilting sprays can be particularly beneficial when used on recently transplanted trees or trees in unusually exposed sites.

The promiscuous spraying with insecticides or fungicides to prevent unknown insect infestation or disease infection should be avoided. Occasionally, an insect infestation may build up and diseases may occur, but the insect or disease should be identified and proper control recommendations secured before spraying starts. The frequent washdown with a forceful stream of water will assist materially in preventing the buildup of serious insect infestations.

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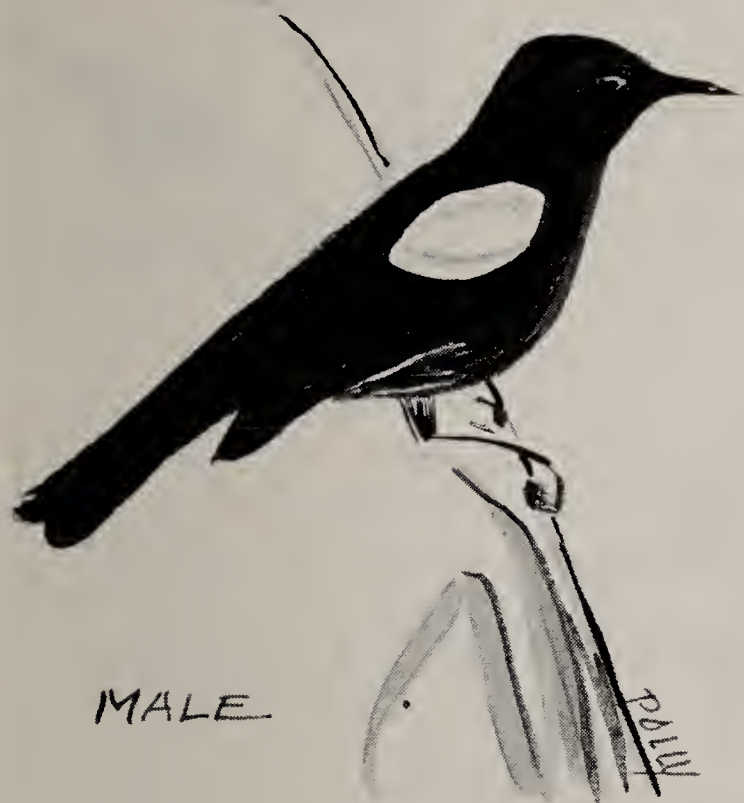
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Birds in YOUR GARDEN

POLLY STEELE



THOSE NEW at bird identification have no difficulty recognizing the male Redwing Blackbird. However, they inquire, "What is the brown-striped bird, the one about the size of a small robin?" They seldom compare this well-defined, striped brown bird to her mate, the Redwing Blackbird; they do not associate these two birds. To the new observer their coloring makes them appear so different. Once experienced in "birding," one learns in a great many birds there are differences in the male and the female, but there is no difference more marked in coloring than the Redwing Blackbird.

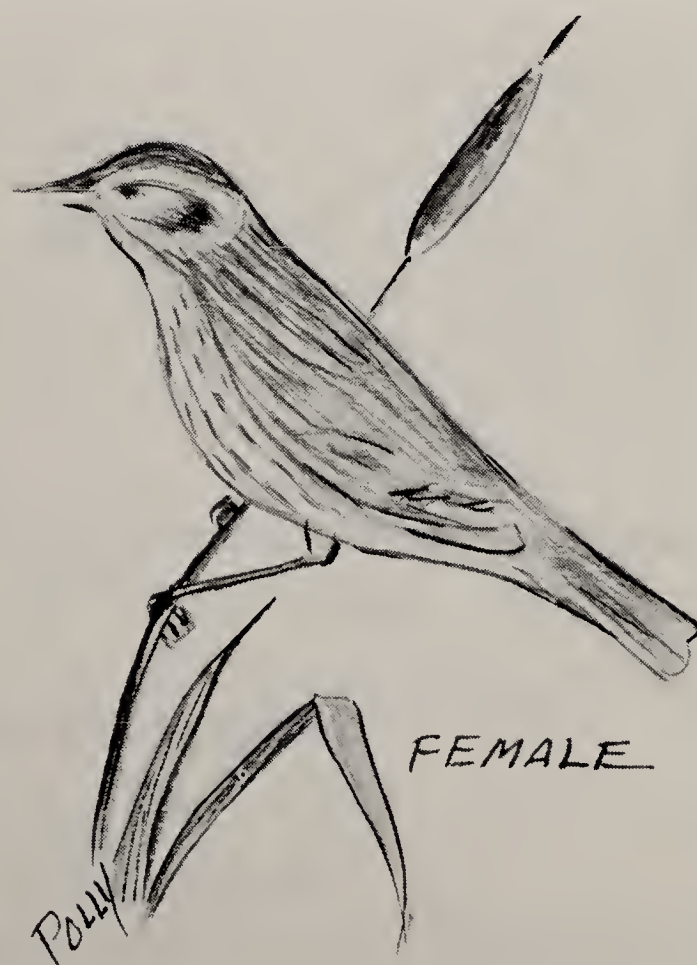
If you live in the suburbs with irrigation and marshy areas nearby, Redwing Blackbirds will be most happy to

visit your garden. Provide a simple feeder with a wild bird feed mixture.

For an easy study of Redwing Blackbirds visit Denver's Museum of Natural History in City Park. You will find them in the Prairie Group on the third floor. Also, a pair of Redwing Blackbirds and a nest are included in the W. C. Bradbury collection.

We recently visited the attractive garden of Mrs. Harvey Butterfield, President of the Arvada Garden Club. She was attracting these birds with a make-it-yourself feeder. Here are the materials which she used: two pie tins, one #3 tall can, and wire. You can make one too, if you follow this procedure:

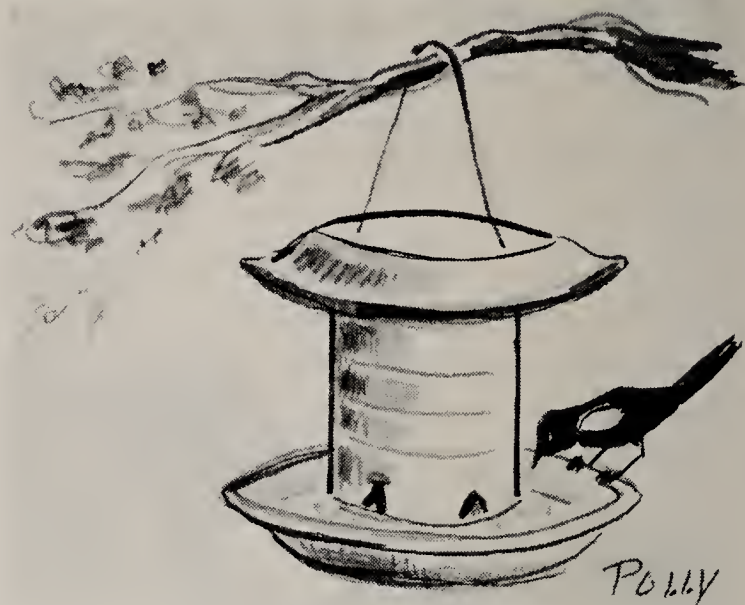
Cut the top out of one end of the can. Punch four ½-inch holes around



the base of the can to permit the seed to feed down into the bottom tin. With a nail, punch holes in the tin and the can to thread wire through for attaching the two together. (This pie tin serves as a feeding ring for seed.) Now attach an 18- or 20-inch-long wire to the top of the can and bring it up through the second pie tin, which serves as a roof for the feeder. Make these two nail holes in the second pan large enough that the lid can be raised or lowered easily, thus facilitating filling the feeder. Hang the feeder by this wire.

Mrs. Butterfield's feeder was painted

a soft green and was hung in a peach tree adjoining her patio.



Flower Tips...

SOCIETY OF AMERICAN FLORISTS

Washington, D. C.

IF YOU'RE planning to leave on an extended trip and can't get someone to water your plants in your absence, try the wick-watering method.

First, water all plants thoroughly. Submerge their pots up to their rims in tepid water for about 30 minutes and spray all leaves except fuzzy ones. Then take these steps:

1. Set all pots around a large container of water. The container should be level with, or higher than, the pots.

(Or use several individual quart bottles of water.)

2. Use 18-inch lengths of cotton wicking or clothesline with the dressing removed. To prevent water evaporation, cover the middle section of each strip with aluminum foil.

3. Insert one end of the strip into the water; the other end insert into the soil of each pot. For a two-weeks' supply, use 1 quart of water for every two 6-inch pots.

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Flag Pole Committee

Colorado Chapter DAR

THE COLORADO CHAPTER, Daughters of the American Revolution, presented to the Denver Botanic Gardens an American flag and a 30-foot tapered aluminum pole on Flag Day, June 14, 1962. The impressive ceremony at 3:00 p.m. was held at the Flag Pole Site, between Josephine and York Streets, across from the main gate to the Gardens, with about 75 persons in attendance.

Presentation of the gift, which was marked with a bronze plaque at the base, was made by the Regent of the Colorado Chapter, Mrs. Ralph T. Brigham. She said, in part, "It is the constant endeavor of the Daughters of the American Revolution to increase the feeling of patriotism in our country. Our flag is symbolic of the deep appreciation we have for the opportunities offered to the citizens of this nation. In these threatening times there should be an increased interest in patriotism with emphasis on faith in our country and a determination through action to defend it and its principles."

In presenting the gift to Mr. Lawrence A. Long, President of the Board of Trustees of Denver Botanic Gar-

dens, Mrs. Brigham congratulated Botanic Gardens on having successfully raised the money for the development of this project, which has given to Denver a beauty spot unparalleled this side of the Mississippi River, with the natural background of the majestic Rockies as a setting nowhere equalled. The efforts of the Board of Trustees and of the Director, Dr. A. C. Hildreth, by their long-range plan and vision, will be richly rewarded in providing for Denver, and for her visitors, gardens of great beauty and of horticultural importance.

Mr. Long graciously accepted the gift for the Botanic Gardens and Mr. Willard Greim, Manager, Department of Parks and Recreation, expressed the thanks and appreciation from the city. The Flag Service was led by Sea Scout David Abbott, Jr., assisted by four Explorer Scouts who raised the flag and led the group in the pledge of allegiance.

Following the ceremony, guests repaired to Botanic Garden House where they were entertained at a tea planned by Mrs. Alonzo Lilly and her assistant hostesses.

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PLANT DISEASE CONTROL

J. L. FORSBERG
Plant Pathologist

Illinois Natural History Survey, Urbana, Illinois

Reprinted from the Illinois State Florists' Association Bulletin, No. 217, July-August 1961, and No. 218, September 1961.

Dr. Forsberg will be remembered by many readers as the author of *Diseases of Ornamental Plants* which was published at Fort Collins in 1946. Following issues of *The Green Thumb* will carry a series of articles about ornamental plant diseases by Dr. Forsberg which have previously appeared in the Illinois State Florists' Association Bulletin. (Editor)

GROWERS often ask the question, "What's new in plant disease control?"

This is a perfectly logical question, but usually the grower wants an answer that is not forthcoming. He hopes to be told that a miraculous new discovery has been made so that all his disease problems can be ended without much effort on his part.

PREVENTION EASIER THAN CURE

Nothing seems impossible in these days of automation; even plant disease control can be almost automatic, if we wisely use our knowledge of the causes and conditions that bring about plant diseases. But we must remember that control of plant diseases is not something that can be turned on and off like an electric light or a water faucet.

For a commercial plant grower, plant disease control must be a way of life. Nearly every operation he carries out in growing a crop is in some way related to disease control. Plant disease control is largely preventive rather than curative. This generally means that disease control must be carried out by the grower himself with the aid of whatever knowledge and technical advice he can bring to bear on the problem.

WHERE THE PATHOLOGIST FITS IN

It is the plant pathologist's job to find ways of controlling plant diseases.

This is sometimes much easier than getting growers to use them.

Jessie I. Wood, in the 1953 *Yearbook of Agriculture*, said, "Increasing our knowledge about diseases will allow us to gain more advantage over them — provided we make use of it. The available control measures are not nearly so often or so efficiently used as they should be." Ezra Taft Benson, in the same *Yearbook*, said, "The cost of materials and equipment for fighting diseases has become enormous. And finally, our efforts against plant diseases are made harder by the lack of information about them among many persons who have to do with plants and plant products." Plant disease control measures were not developed overnight or in a few short days. Rather, they have developed slowly over a long period of time as our knowledge of the nature and causes of diseases became better understood.

ESSENTIALS OF DISEASE CONTROL

There has been close parallel development of disease control practices in plants and animals. Both have progressed from superstitious practices, through use of antiseptics on animals and sprays on plants, to aseptic procedures, to use of antibiotics on animals and plants and retardant or antagonistic organisms in soil. With plants this has emphasized pathogen-

free soil and propagative material, and cultural techniques to keep them that way. This, the central core of the U.C. System proposed by Dr. Kenneth Baker and his associates in California, is expressed in the motto, "Don't fight 'em, eliminate 'em."

It has been truly said, "The best way to avoid trouble is to keep it from starting." That is the key to successful control of plant diseases.

Nearly all plant disease control measures are based on prevention. With few exceptions, diseased plants cannot be cured in the sense that affected parts can be restored to normal functioning. Infection by a parasitic organism usually results in injury or destruction of the whole or a portion of the plant. The typical plant parasite cannot be reached by chemical dusts or sprays after it has entered the plant. Any treatment drastic enough to destroy a parasite within the plant usually destroys the plant itself.

Thus, control measures must be based upon the application of one or more of these five fundamental principles: sanitation, exclusion, eradication, protection, and development of resistance.

Sanitation

The practice of strict sanitary measures is of utmost importance in preventing spread of fungous and bacterial diseases. Since many disease-producing organisms over-winter in plant debris, all old plant parts should be raked up and burned. Some kinds of diseased plants should not be allowed to remain in a planting because they are sources of infection which may spread to healthy plants. This applies to greenhouse conditions as well as to outdoor plantings.

Exclusion

It is easier to exclude many diseases

from plantings than it is to control them after they appear.

Federal and state quarantine regulations have been established to prevent the dissemination of certain dangerous insects and diseases. Individual growers can do much toward preventing the introduction of diseases into their plantings. Extreme caution should be exercised in accepting plants which are not known to be free from disease. If field inspections of plants cannot be made prior to purchase, it is well to establish and maintain segregated plots at some distance from the main planting. Mother blocks of healthy plants for propagation purposes should be established for plants that are propagated by cuttings.

Eradication

Eradication involves getting rid of parasites after they have become established in a planting. In many instances, diseased plants should be removed from the planting and destroyed as soon as they are noticed. In some cases it is necessary to remove only a portion of the plant. When the causal agent of a disease is soil-borne, sterilization of the soil is necessary. Certain parasites which occur almost entirely on the surface of the host, such as powdery mildews, can be eradicated by spraying or dusting the plant with the proper fungicides.

Protection

Certain diseases may be prevented by using fungicides to protect the plants from infection. Sprays or dusts must be applied before the disease appears, or at least before it has become well established. Sprays and dusts are most effective when applied before rains, heavy dews, fogs, or application of water, because infection occurs only when moisture is present. It is essential to obtain complete coverage and it

is usually necessary to make repeated applications.

Development of Resistance

Varieties of plants which are resistant to certain diseases have been developed. Other factors being equal, resistant varieties should be used whenever possible.

CULTURAL PRACTICES

Proper cultural practices can do much toward preventing certain diseases. Vigorous, well-kept plants usually have a better chance of escaping disease than poorly-cared-for plants. Adjusting the temperature and humidity aids in controlling mildews and leaf molds in greenhouses. Proper watering does much toward preventing damping-off. Over-fertilization, especially with nitrogen fertilizer, should be avoided.

FUNGICIDES

Fungicides are chemicals that are toxic to fungi. The modern era of fungicide research dates from the discovery of Bordeaux mixture about 1880. However, by trial and error men had found that chemicals could be useful long before Bordeaux was discovered.

Sulfur was known as a pest-averting material by Homer in 1000 B.C. and probably was in general use by 1800. Development of new fungicides was very slow until 1940 when the first synthetic organic fungicides appeared. Since 1940 hundreds of new compounds with fungicidal properties have been developed.

Fungicides are usually applied to the aerial parts of plants in the form of sprays or dusts, although in many cases they are used to treat seeds, corms, and bulbs before planting. Some fungicides are applied to the soil to destroy certain soil-inhabiting organisms.

No single compound is suitable for

all purposes or effective against all fungi. Some fungicides will burn tender foliage if they are used improperly; others are undesirable because they discolor the plants. Growers should follow recommendations closely when using fungicides. If use of an unrecommended fungicide seems desirable, such a material should be tested on a small scale first.

Good Coverage Necessary

Thoroughness is essential when applying fungicides. A good spray covers all surfaces of the plants with a uniform film which cannot be washed off easily after drying. High pressure equipment produces a finer mist which results in more perfect coverage, less danger of spray burn, and less loss from dripping or run-off than is the case when low pressure is used. Selection of equipment, of course, depends on the kind of crop and the area to be covered. Suitable sprayers and dusters, ranging from small hand-operated equipment to large power outfits, are available.

In general, the purpose of fungicides is to protect plants from infection. To be effective, they must be used before a disease becomes too well established. The timing and the number of applications can be regulated much better if one has a knowledge of the life history of the parasite. The most effective times to combat an organism occur during certain periods of its life cycle. Such periods may be long or short, varying with different parasites.

Systemic Fungicides

Some progress has been made in development of systemic fungicides. These are chemicals which, when absorbed by the plant, act against a fungus already within the plant or prevent the fungus from infecting the plant. Although plant chemotherapy holds

much promise, it has not yet developed into practical disease control.

Spraying versus Dusting

The decision whether to dust or to spray plants depends on a number of factors. Dusting can be done quicker than spraying, but sprays usually have a more lasting effect than dusts. Dusting equipment is usually lighter and easier to handle than spray equipment. Dusts are less likely to cause burning and they do not discolor the foliage as do some sprays. Dusts are usually more expensive than sprays. Spray coatings adhere to most plants more readily than dusts, especially if a good spreader or sticker is used.

FUNGICIDAL MATERIALS

Most of the older fungicides contained copper, sulfur, or mercury as the toxic principle. Most of the newer materials are complex organic chemicals.

Since many fungicides of similar composition are sold under different trade names, growers may be confused when selecting a fungicide. Federal regulations require that the percentage composition of fungicides be printed on the containers. Before using any fungicide, a grower should find out if the material contains the ingredients recommended for use against the disease he wishes to control.

Here are some of the most important fungicides in use today:

Copper Fungicides—Bordeaux mixture is the best known and most widely used copper-containing fungicide. Although it has been largely replaced by newer fungicides, Bordeaux mixture is still used by many growers. It is composed of copper sulfate, lime, and water. The formula 2-4-50 indicates that 2 lbs. of copper sulfate and 4 lbs. of lime are mixed with 50 gallons of water. The amounts of copper sulfate

and lime may be varied according to the use for which the spray is intended. A 2-2-50 formula has given satisfactory control of many diseases of ornamental plants.

A solution of Burgundy mixture may be used instead of Bordeaux when it is necessary to avoid spotting the foliage. It is composed of 2 lbs. of copper sulfate and 3 lbs. of sodium carbonate (sal soda) in 100 gallons of water.

Copper-lime dusts have been used as substitutes for copper-containing sprays. The usual mixture contains 80% of hydrated lime and 20% monohydrated copper sulfate by weight. It can be mixed at home or bought ready to use. The dust should be applied when the plants are wet.

Yellow cuprous oxide may be used as a spray.

Sulfur Fungicides — Sulfur is one of the oldest fungicides and it is still one of the best for certain purposes. Dusting sulfurs are especially prepared dry forms of sulfur powdered finely enough to pass through a 325-mesh screen. The ordinary “flowers of sulfur” is too coarse for dusting purposes.

Wettable sulfurs are combinations of one of the forms of powdered sulfur with a wetting agent which enables the sulfur to be mixed readily with water to form a spray mixture. These preparations adhere well and do not burn the foliage unless they are used when the temperature is extremely high.

Vaporized sulfur is the best material available for control of powdery mildew in greenhouses. A slurry made by mixing 1 lb. of wettable sulfur in 1 pint of water may be painted on heating pipes in the greenhouse. The heat will vaporize the sulfur into the air, where it will condense and settle in fine particles on the plants. Flowers of sulfur may be vaporized in special sulfur vaporizers.

Lime-sulfur can be purchased in powder form or as a concentrated lime-sulfur solution. As a summer spray, it is used at the rate of 1 gallon of liquid or 4 lbs. of dry lime-sulfur to 50 gallons of water ($\frac{3}{5}$ pint or 10 oz. to each 3 gallons). As a dormant spray the strength used is one part liquid to nine parts of water, or 2 lbs. of dry lime-sulfur in 5 gallons of water. Lime-sulfur is injurious to some plants and therefore should be used with caution if its effects on the plants are not known.

Mercury Compounds — Mercuric chloride or bichloride of mercury, also known as corrosive sublimate, is a commonly used disinfecting agent. It can be obtained in the powder or tablet form. The powder form dissolves slowly in cold water but dissolves readily in hot water. Because of the corrosive action of this compound, wooden or crockery vessels rather than metal containers should be used for the solutions. Mercuric chloride is extremely poisonous to man and animals if taken internally.

Organic mercury compounds have

been prepared primarily for use in seed treatments but some of them are used for other disinfecting purposes, especially bulb and corm treatments. A few organic mercury compounds have been prepared to be used as foliage sprays.

Synthetic Organic Fungicides — Many new organic fungicides have been developed recently. In many instances these materials have replaced the older fungicides in disease control programs. Because so many new materials have been developed so rapidly, all of their uses have not been determined. New and better fungicides will be developed and new uses for existing materials will be found as long as research is continued.

Many of the organic fungicides have been used to control diseases of floricultural crops. Undoubtedly, some materials other than those used might be just as effective for a particular purpose but are untested. Growers, however, should use only the recommended materials unless they wish to try an unrecommended material on a small scale.



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The 7-UP CLUB

at Children's Garden

Young gardeners at the Children's Garden of Denver Botanic Gardens have formed the 7-Up Club to keep their gardens free of weeds. Each junior gardener must pull seven weeds each day to remain a club member in good standing. Once a month 7-Up Club members will be rewarded with a 7-Up Party; refreshments will be 7-Up.

Forty of the 90 young gardeners enrolled in the Children's Gardens, located between York and Josephine streets, across from Denver Botanic Gardens, enjoyed their first 7-Up Party Monday, June 11, at 10:30 a.m.

Each young gardener, under the supervision of Dr. A. C. Hildreth, Director of Denver Botanic Gardens, has a plot which he plants, cultivates, and eventually will harvest. During the morning hours when the children come to garden, the Children's Garden is supervised by members of a volunteer committee headed by Mrs. James C. Layden.



The seven champion weed pullers of the 7-Up Club at the Children's Garden at Denver Botanic Gardens. Left to right: Denny Weber, 11; Toby Layden, 9; Ellen Snyder, 10; John Gibbons, 9; Alice Jones, 12; Jack Kenney, 11; and Susan Costello, 9.

Aa Bb Cc's of

PLANT BREEDING

PART III

MORAS L. SHUBERT
University of Denver

WE CLOSED Part II in the July issue of *The Green Thumb* with a homework problem. Did you solve it? If you made the combinations of the four kinds of pollen with the four kinds of ovules correctly, you found these kinds of seeds were produced: 1, RRYy; 2, RRYy; 3, RrYY; 4, RrYy (nine round, yellow seeds); 1, RRyy; 2, Rryy (three round, green seeds); 1, rrYY; 2, rrYy (three wrinkled, yellow seeds); 1, rryy (wrinkled, green seed). Notice that the ratio is 9:3:3:1. This proportion will hold approximately true for inbreeding a *dihybrid* of this kind for any number of seeds produced. If you produced a bushel of such seeds, 1/16 of the bushel would be the double recessive seeds, wrinkled and green. If you did not get these results, it will pay you to rework the problem in order to have a clear understanding of the principles before proceeding to our next steps.

SOME VOCABULARY ADDITIONS

In the several examples which we have been studying it is evident that a parent with a trait governed by a pair of dissimilar genes, for example, Tt, Rr, Yy, can produce two kinds of pollen and two kinds of ovules. Exactly half of the pollen from an Rr parent, for instance, will carry the "R" gene and the other half will carry the "r" gene.

This equal distribution of the two members of each pair of the chromosomes that carry the genes on a 50:50 basis to the offspring is dependent upon a special kind of *reduction division* at the time the pollen and the ovules are being formed and is referred to as *gene segregation*.

To make it easier to talk about genetic combinations, we should start using several words that describe precisely what we mean. One of these words describes the condition when both members of a gene pair are identical (as shown when we use symbols RR, rr, TT, AA, BB, cc, etc.). We say that the individual is *homozygous* for such identical pairs. In the opposite condition where gene pairs are made up of two variants (Rr, Tt, Aa, Bb, Cc, etc.), the word *heterozygous* is appropriate. If we refer back to the problem on pea inheritance in which a dihybrid, RrYy, was self-pollinated, we will see how these words are used. The parent plant is said to be heterozygous for both seed shape (Rr) and for seed color (Yy). Each of the following are homozygous combinations: RRYy, RRyy, rrYY, and rryy. A seed might have this gene combination, RRYy, and we would say it is homozygous for shape but heterozygous for color. Incidentally, when there is complete dominance of one gene over its recessive

mate, the heterozygous individual is often spoken of as a *carrier*, meaning that the recessive gene is present, though hidden.

And now two other words must be added to our vocabulary. The first of these is the word *phenotype*, which includes all individuals that have the same characteristics, whether or not they are genetically identical. Going back to the pea experiment again, we would say that all the peas that were round and yellow were of the same phenotype. Specifically, these would be the seeds that had the following gene combinations: RRY^Y, RRY^y, RrY^Y, and RrY^y. But it is easy to see, even though the seeds would look alike, that four types of genetic combination can be said to be four *genotypes*. In other words, a genotypic group is identical, genetically, for the characteristics that are being described. Genotypes will be phenotypic, but phenotypes may include various genotypes.

LACK OF DOMINANCE

Do you have any four-o'clock plants in your garden? Probably not, as they are too old-fashioned, aren't they? At any rate, if you were to crossbreed a red-flowered variety with a white-flowered one by removing the stamens and the petals from a flower just ready to open and pollinating it with the stamens from a flower of the opposite color you would get seed that would grow into pink-flowered plants. I believe that you will agree that the F₁ pink color of the petals is about midway between red and white. This means that neither red nor white is dominant, but that each expresses itself about equally in the offspring. We can say that there is a lack of dominance for these two kinds of genes, or else we can say that they show equal

dominance. Actually, this is not a rarity, but to the contrary; it is probably more common than are cases of complete dominance. Do not feel disillusioned, because this condition is very helpful. It makes it possible for us to pick out the heterozygous individuals, which in cases of complete dominance look exactly like the homozygous dominant ones. This brings up another very easy little problem: Suppose that we obtained 100 seeds by self-pollinating pink four-o'clock flowers and planted them. How many colors would be represented in these F₂ progeny and how many of each? If you have trouble seeing that there should be 25 red-flowered plants, 25 white, and 50 pink, you had better review Mandel's experiment where he inbred heterozygous tall plants. (See p. 206 of the July issue.)

MULTIPLE GENE CONTROL

Previously, we have been talking about traits that are controlled by a single pair of genes. Many traits are not so simply governed but instead are under the control of two or more pairs of genes located on several different pairs of chromosomes. For a reason which will show up later, we find that many of our cultivated plants have such complicated determiners of their characteristics. Those who have hybridized irises of two different colors are sometimes amazed by the many different colors and intensities of color found in the seedlings. If only one pair of genes governed flower color, we could expect no more than three or four variations to appear in the offspring from such a cross. When traits are regulated by two or more pairs of genes, it is easy to see that such traits may vary by small degrees over a wide range. Such traits are spoken of as *quantitative characters*.

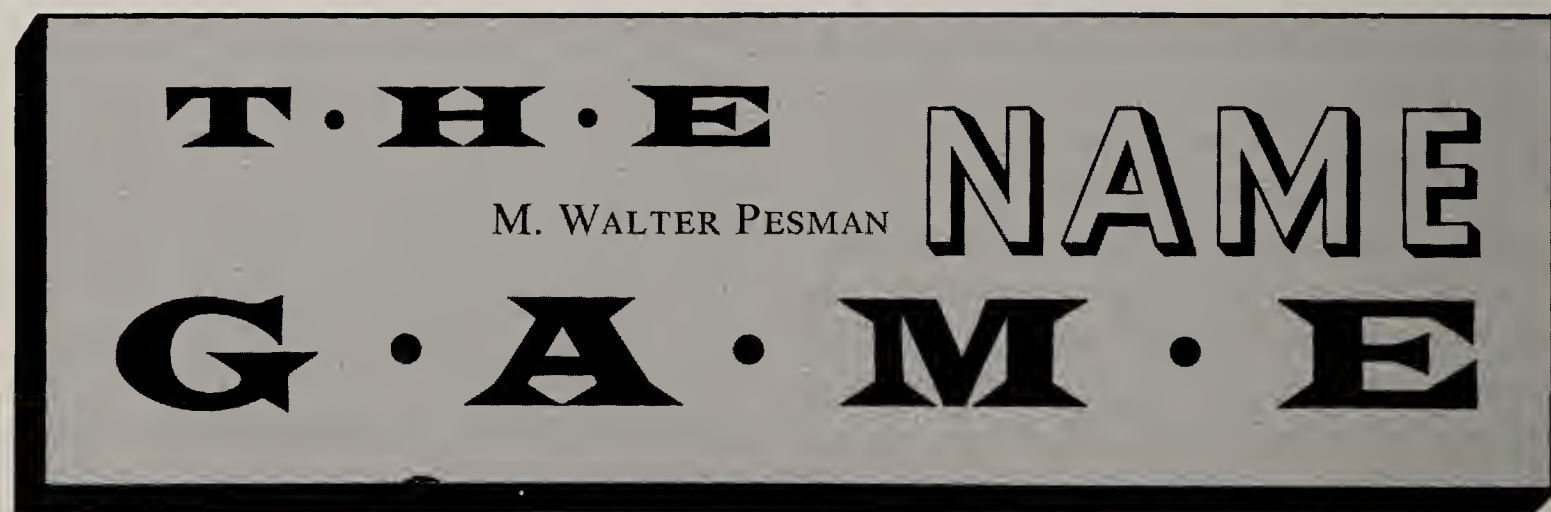
This condition presents, simultane-

ously, problems and rewards to the plant breeder. A major problem is that when there are several pairs of genes involved, the ability to predict results suffers. If two highly heterozygous parents that have six different genes carried on three pairs of chromosomes are mated, a great number of variants could appear in the seedlings. On the other hand, where variation is just the thing that is desired so that selections can be made from a great number of variants, quantitative characters provide this range of variability. If you want a good example of this, think of the multitude of color varieties in a collection of bearded iris.

Along this same line, there is another multiple-gene-effect that must be mentioned. Sometimes one pair of genes will inhibit the other, or in other cases, one set may require the presence of a second set before a trait will be developed. An example of this latter type provides an interesting illustration of *complementary genes*. It is possible to crossbreed two white-flowered sweetpeas (of a certain variety) and to get

seeds which grow into plants that have purple flowers. This rather shocking result depends upon one white-flowered variant having a color factor (genes) but no complementary factor which is necessary for color expression. The second variety does have the complementary factor, but it lacks the color factor. When the two are cross-pollinated, the progeny then get both the required color factor and the complementary factor, so the purple color is produced in the petals.

This is a good place to assign a homework problem. Figure out the ratio of purple-flowered plants to white-flowered ones if we self-pollinate flowers that are heterozygous purple, PpCc, where "P" is the gene necessary for purple and is completely dominant over "p," and "C" is the complementary gene that brings out purple color and is likewise dominant over "c." The 16-square diagram with pollen-kinds across the top and ovule-kinds down the side should provide the answer which will be given in "AaBbCc's of Plant Breeding," Part IV.



A "pachyderm" is a thick skin.

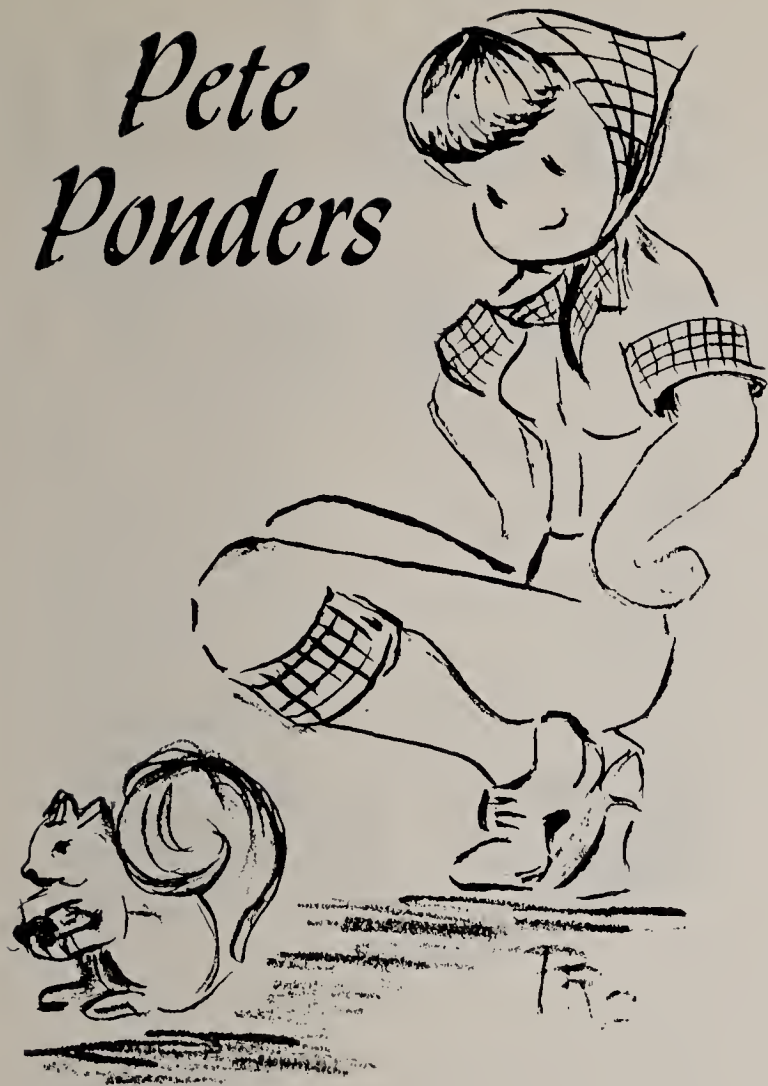
Pachycereus is a thick candle-cactus.

Pachistima is the botanical name for a dainty native evergreen ground-cover; the name has reference to its thick stigmas.

The Pentagon is a five-cornered building. Botanists used *penta* long ago. (See the September issue of *The Green Thumb*.)



Pete Ponders



Dear Pete,

Buckeye and horsechestnut trees are so symmetrical and their foliage is so dense and beautiful that their blossoms and nuts are a special dividend. (You can see I'm their admirer.) For fun I'd like to grow some from seed. What shall I do, pretend I'm a squirrel?

BUCK EYED

Dear Buck,

Basically, the squirrel's method is the way.

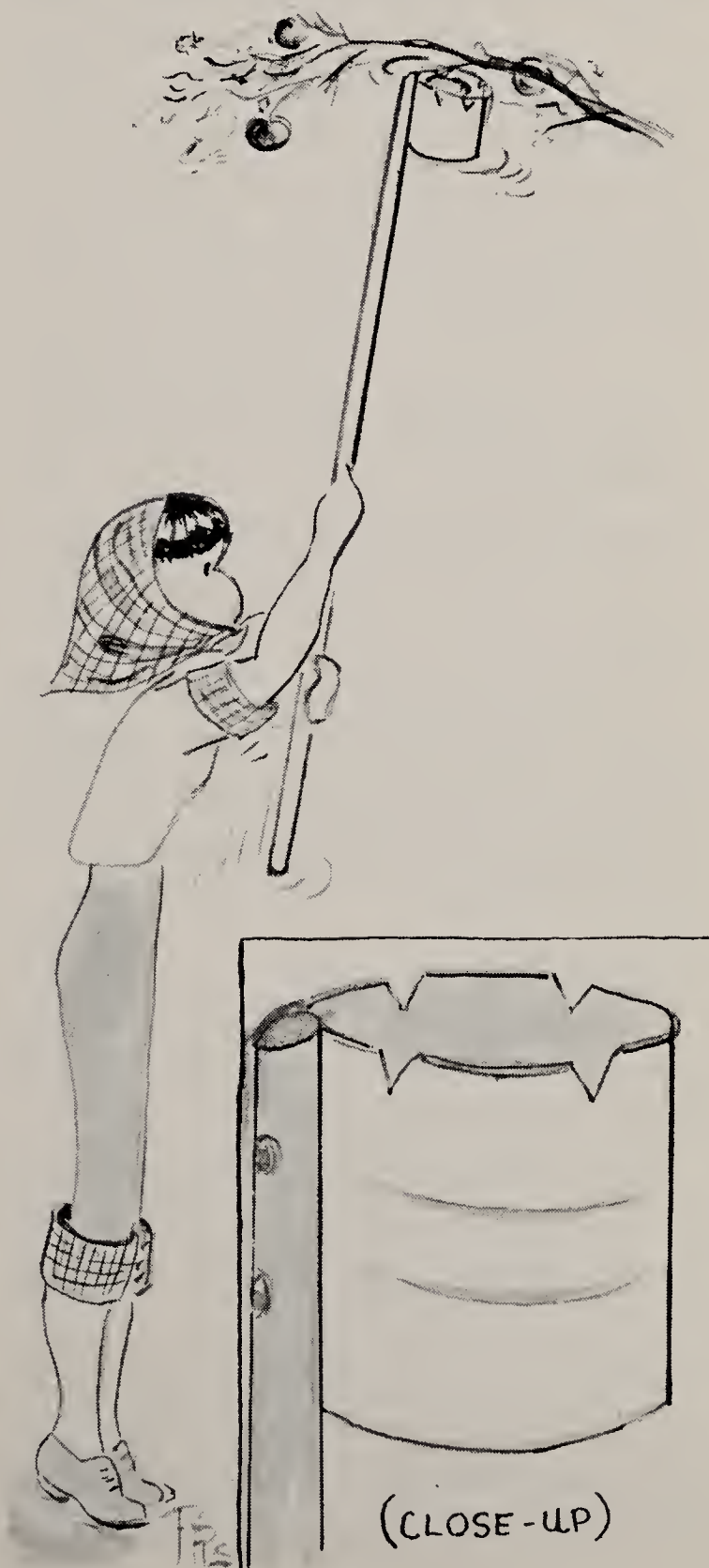
Using a few modifications, Gordon Lee's household has experienced such success that they have a tree garden of 90-100 buckeyes, horsechestnuts, walnuts, and oaks.

First, get to the ingathering before the squirrel arrives. Plant the nuts immediately in good garden loam in cans from pop-size to 5-gallon. Make drainage holes near the base of the can with a bottleopener. Sink the can into the ground leaving a $\frac{3}{4}$ -inch band ex-

tending above the ground. Plant the seed 2 to 3 inches below the soil level. Water thoroughly and keep moist. In the fall mulch with 2 to 3 inches of leaves, and remove the mulch *only* after all danger of frost is past. Mulch for two or three successive winters.

Dear Pete,

Here in North Denver we reap bumper peach crops about three out of four years. We've had repeated success with the varieties Hale Haven and Polly. Always the largest, juiciest fruits



are clinging to the top of the tree. Is there such a tool as a picker's aid?

NONA BRUISE D'PEACH

Dear Nona,

In the December 1961 issue of *The Green Thumb*, Julia Andrews suggested a basket-type picker's aid available commercially.

Gilbert Dayton, one of Carl Schulhoff's cohorts, offers this simple make-it-yourself model. Cut three or four V-notches in a #2½ can. Firmly attach the can to a good, strong, wooden pole. (An aluminum pole affords lightness in handling, but it is also a good conductor of electricity and could cause a fatality should the tool accidentally strike power wires.) In using the picker's aid get the fruit in the can (Let the V serve as a knife.) and, with the stem in the V, give a flick of the wrist — you've cut the stem. The luscious fruit is yours.

(Look, no bruises to you or the peach!)

Dear Pete,

I've heard some folks make Oregon grape jelly from our native *Mahonia repens*. Can it be true? The wild fruit has such a discouraging taste!

NATIVE JELL

Dear Native,

How true. The fruit does have a discouraging flavor. It does make tangy jelly that few fruits surpass.

Dr. Moras Shubert and his bride, Erne, may be spotted any early August crouching along the foothills gathering their favorite wild fruit.

To make the jelly they suggest gathering the berries when they are just developing their full blue color. Either shell off the berries or pick the clusters,



but do not damage the plants; you'll want to return to the same spot next year!

After sorting and washing the berries (It is not necessary to remove the stems.), barely cover them with water in the cooking vessel. Heat to boiling and break the berries with a potato masher. Drain and strain the hot juice through a muslin bag. When the pulp is sufficiently cool, squeeze the bag vigorously. (The stain will come off your hands.)

Use any of the prepared dry pectins in making the jelly. Follow the directions on the package, *except*, use equal amounts of sugar and juice, "cup for cup." These proportions require a slightly longer cooking period to reach the point when the boiling juice will "sheet" from the stirring spoon.

Try it; it's delectable.

Hay Fever

HELEN MARSH ZEINER
University of Denver

VILLAINS

HAY FEVER is a synonym for misery to its many victims, while non-sufferers tend to look upon it as a huge joke. Actually, the person afflicted with hay fever is truly miserable and the running nose, watery eyes, and frequent sneezes are no joke to him. Hay fever is an allergy-caused affliction; the offending agent is chiefly air-borne pollen of a number of common plants. More technically, hay fever is described as "a catarrhal affection of the mucous membranes of eyes, nose, and respiratory tract, often with fever and asthma, caused chiefly by inhaled pollen of various plants."

For many hay fever sufferers this is the peak season, for now several common and particularly offensive weeds are shedding their pollen in quantity. A few of the more common offenders now causing trouble are briefly described below:

Ambrosia trifida — Giant Ragweed

This is a coarse, tall annual, reaching heights of at least 3 feet. The stem is stout, almost woody. It bears opposite leaves. The leaves are somewhat variable but are mostly 3-5 lobed, palmate. Numerous heads of staminate flowers shed pollen from July to October. Giant ragweed is often found in roadside ditches, old fields, or disturbed ground. It is especially common in moist sites.

Ambrosia elatior — Short Ragweed, Common Ragweed

Common ragweed is a much smaller

annual than giant ragweed. The leaves are opposite above, alternate below, rather thin, and 1-2 pinnatifid. There are numerous heads of staminate flowers shedding pollen from July to October.

Ambrosia coronopifolia (*A. psilostachya*) — Western Ragweed

This is a perennial ragweed somewhat resembling short ragweed but with thicker leaves with short, gray hairs on both sides of the leaves. It also sheds pollen in abundance from July to October.

Iva xanthifolia — Burweed Marsh Elder, Poverty Weed, False Ragweed

This is a tall, stout annual with large, somewhat heart-shaped leaves which are very like sunflower leaves. The staminate flowers grow in small greenish heads grouped in a loose inflorescence and shed their pollen mostly in August and September. *Iva* grows in much the same situations as giant ragweed, and the two are often found together.

Amaranthus retroflexus — Redroot Pigweed, Redroot

Redroot is a common garden weed, cooked as greens when young and tender. Height will vary from 6 inches to 2 or 3 feet. It is a stout, much-branched plant. The leaves are variable, generally ovate to lanceolate, rounded at the base and tapering to a point at the apex, often hairy beneath. The midribs and veins are often reddish. The red root is very character-

istic, resulting in the common name. Green flowers in densely crowded, bristly spikes can be found from June through October.

Kochia scoparia — Summer Cypress, Fireweed

Kochia is a trouble-maker from June to September. It is an annual weed found in old fields, along roadsides, and on disturbed soil in general. It is a much-branched bushy plant, growing from 10 inches to about 3 feet tall. The stems are often red-tinged. The leaves are narrow and somewhat hairy. The inconspicuous flowers occur in spikes in the axils of the leaves.

Salsola kali — Russian Thistle

This well-known weed grows in a compact, much-branched clump, breaking at the base when dry to form our familiar tumbleweed. It can be recognized when young by its tiny, spiny leaves, and by the longitudinal stripes on the stems, sometimes green but often purplish-red. This plant is an offender from July to October.

Artemesia — Sagebrush, Wormwood, Sage

Several species of *Artemesia* are hay fever villains. They may be either herbaceous weeds or small shrubs, nearly always with silvery leaves. Most of their pollen is shed from July to October.

This is by no means a complete list of hay fever plants — well over a hundred important hay fever plants are listed for Colorado. Generally speaking, they are plants with inconspicuous flowers borne in large numbers and producing a great quantity of pollen which is carried by the wind. Some allergy victims can tell you that their troubles start as early as February when certain trees, such as the silver maple or American elm, begin to bloom and shed pollen. From March to May many trees are offenders. Various species of grasses add to the pollen count from early spring throughout the summer, and many other flowering plants produce pollen from early summer until frost. Many, such as the ragweeds (*Ambrosia*), are members of the Composite family.

Hay fever victims would do well to learn to recognize the plants to which they are allergic, avoiding them or destroying them. Most plant manuals have adequate descriptions of these plants. *Colorado Weeds* by Thornton and Durrell would be a helpful publication. Herbariums, such as the Kathryn Kalmbach Herbarium at Botanic Gardens House or those at universities in the area, can usually be consulted to see actual preserved specimens of the plants in question.

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SOME DISEASES OF SHADE TREES

J. C. CARTER
Illinois Natural History Survey
Urbana, Illinois

This is the second part of the article on shade tree diseases by Dr. Carter and is a discussion of stem and vascular diseases. The first part of this article, dealing with leaf diseases, was published in the July 1962 issue of *The Green Thumb*. (Editor)

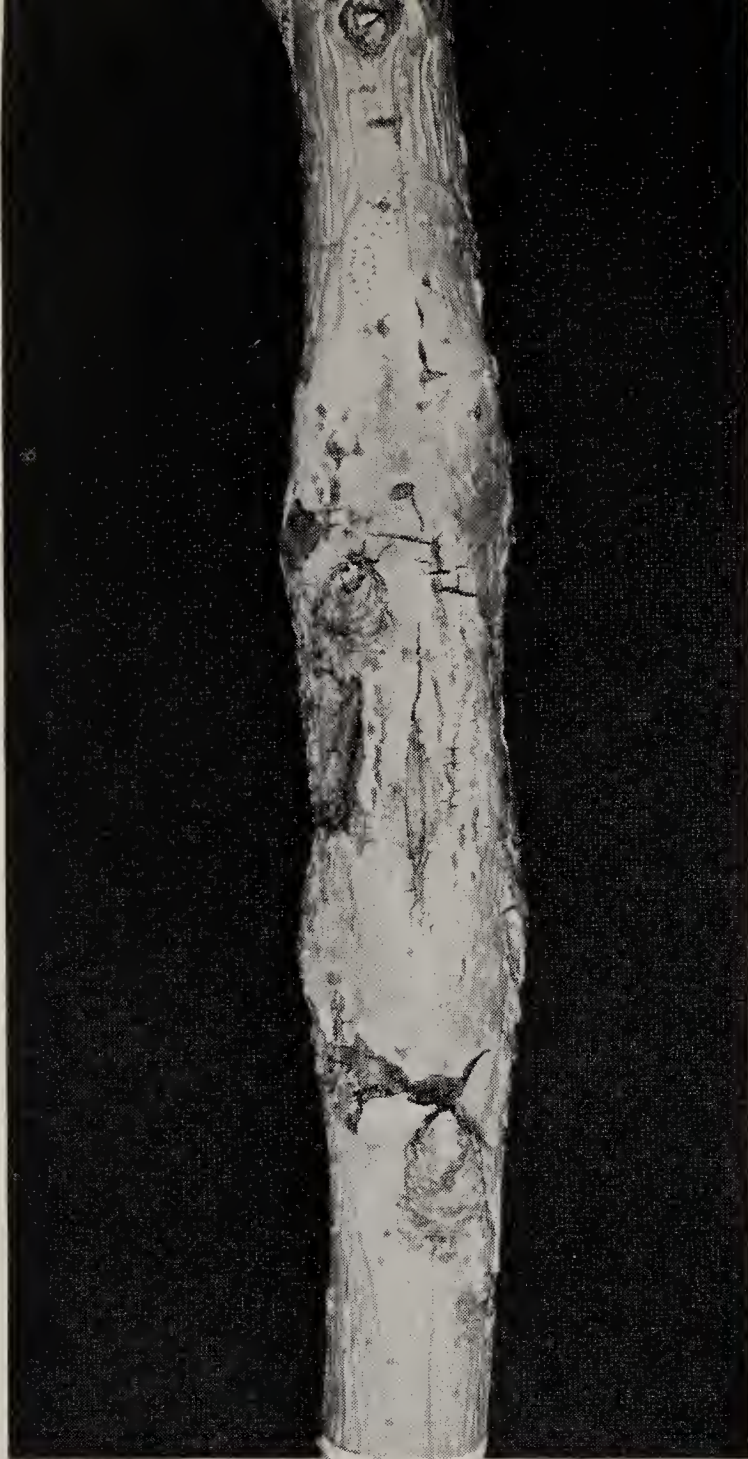
STEM DISEASES

STEM DISEASES are caused mainly by infectious agents. Most infectious stem diseases are produced by fungi; however, a few are produced by bacteria or viruses. Noninfectious stem diseases occur infrequently and they are usually caused by physiological disorders or by mechanical injuries. Stem diseases may be confined to twigs or they may appear on branches and trunks. Twigs may be wilted, stunted, distorted, or broken. Branches and trunks may be bleeding, cankered, stunted, distorted, cracked, bruised, or broken. Bark on branches and trunks may be bruised, cracked, perforated with holes, dead, or sloughed.

Fire Blight — This bacterial disease, caused by *Erwinia amylovora*, is a widespread and destructive canker disease. It not only affects apple and pear trees but is common on mountain ash, hawthorn, and cotoneaster; occasionally it affects firethorn, flowering quince, rose, serviceberry, and spirea. In addition to trunk and branch cankers it causes twig blight or dieback and blight of leaves, blossoms, and fruits of mountain ash and other trees. Plants that have large cankers or diseased areas in their stems should be cut and burned. Those that show the disease on only scattered

branches need not be destroyed, but the diseased branches should be removed and burned. Removal of all visible infection in a branch is possible if the branch is cut off 18 inches or more below the base of the external diseased area. Tools used in removing a diseased branch should be treated with a disinfectant to prevent spread of the bacteria to other branches or trees. All large wounds should be painted with a wound dressing. Blossom blight and twig blight can be prevented or reduced by applying one or two sprays of copper sulfate, 4 lbs. in 100 gallons of water, at two-week intervals before buds open. Spread of twig blight during prolonged wet springs can be prevented by spraying with streptomycin as recommended by the manufacturer. The first spray should be applied as soon as twig blight appears and additional sprays at seven-day intervals until July 15.

Cytospora Canker — Another common canker disease of trees is caused by a species of the fungus *Cytospora*. *Cytospora* frequently kills Lombardy and Simon poplars and occasionally causes severe disfiguration of Norway, Colorado blue, and Koster's blue spruce and Douglas fir. The cankers produced on poplars are very conspicu-



Cytospora canker on a branch of Simon poplar.
(Photograph courtesy of Illinois Natural History Survey.)

ous, while those produced on spruce and fir are inconspicuous because the affected bark does not noticeably change color or become depressed. All dead and dying branches of diseased trees should be removed. Trees affected with extensive trunk cankers may be cut and burned or they may be subjected to careful surgery followed by the use of a disinfectant, such as denatured alcohol. Surgery may prolong the lives of some severely affected trees. Wounding a tree should be avoided, since the fungus enters through wounds. Trees should be given plant food to maintain vigorous growth. When it is feasible to do so, planting of species of trees susceptible to the disease should be avoided.

VASCULAR DISEASES

Most vascular diseases are caused by fungi which invade the tree and develop in the sapwood. Vascular diseases, frequently referred to as wilts, may cause the leaves of one or more branches to wilt and die or the entire plant to be killed. The most widespread vascular disease of shade trees is *Verticillium* wilt.

Verticillium Wilt — This wilt, caused by *Verticillium albo-atrum*, is known to affect 16 species of maple in the United States. Other large trees affected by this disease include ailanthus, green ash, catalpa, elm, linden, black locust, Japanese pagodatree, sassafras, tulip-tree, tupelo, and yellowwood. Small trees affected by *Verticillium* wilt include almond, camphortree, goldenrain tree, magnolia, Brazilian pepper tree, Texas and Japanese persimmon, redbud, and Russian olive.

Foliage of affected trees may wilt any time during the growing season. However, most affected trees wilt during late June, July, or August. On

Verticillium wilt affecting an elm tree.
(Photograph courtesy of Illinois Natural History Survey.)



some trees only one to a few branches wilt, on others whole sections wilt, while on still others that are severely affected all branches wilt, and death of the tree follows. Some trees that show a limited amount of wilt may recover and not wilt in succeeding years. In maple, *Verticillium* produces fine green streaks in the young sapwood of wilting branches, especially in sapwood of the current season. In other kinds of trees, *Verticillium* produces brown to yellowish brown streaks in the young sapwood of wilting branches. Since the fungus can live in the soil and invade the trees through the roots, the streaks in the sapwood spread from the roots up through the trunks and into the branches. The basal portions of wilting branches should be examined for the streaks, since these streaks may not extend to the tips of affected branches.

Affected trees should be given plant food and an abundance of water to stimulate vigorous growth. All dead branches or dead wood on branches showing wilt should be removed. However, it is advisable not to remove living branches or twigs on which the leaves are wilting or have recently wilted. Many branches that show foliage wilt do not die but produce a new crop of leaves three or four weeks after wilt has occurred or by the following spring. Pruning will not eliminate the fungus which is present in the trunks and roots of affected trees.

SUGGESTIONS

Many troubles which affect the leaves, branches, trunks, roots, or vascular systems of trees can be determined in the field. Careful and thorough examination of affected plants will show whether the troubles are caused by infectious agents such as fungi, bacteria, and viruses, or by non-infectious agents such as physiological disorders, nutritional deficiencies, or chemical injury. When the cause is determined, appropriate treatment to overcome the trouble can be administered. Prompt treatment may not only save affected plants but may yield protection to nearby healthy plants. Every arborist and nurseryman should be on the alert constantly to discover diseases, to determine their causes, and to administer the most effective treatment for control of each disease and for the preservation of each affected plant that can be saved.

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Exotics of Colorado...

The PEACH

HELEN MARSH ZEINER
University of Denver

ONE OF COLORADO's most important agricultural industries is based on an exotic plant, the peach. This luscious fruit, which we take so much for granted, has a long and interesting history. It is native to China, where numerous varieties have been cultivated for thousands of years. At a very early time the peach was brought to Persia, where it has been so long established that Persia is sometimes credited with being the original home of the peach. The botanical name of the peach, *Prunus persica*, indicates its connection with Persia. From Persia, the peach early spread to other parts of the world. The ancient Romans, for example, knew and enjoyed the peach. In 1883, the famous French botanist, DeCandolle, listed the peach among the plants cultivated for over 4,000 years in Europe.

The history of the peach in America parallels the coming of the white man. It is known that the Spaniards brought peaches to Mexico and Florida. Peaches were well suited to the climate, the Indians liked the fruit, and by the time the English colonist came, Indian peach "orchards" were widespread. In fact, peaches were so thoroughly established that some of the early botanists thought that peaches were native to America. Some of these trees, although inferior in fruit, are still used as rootstocks. The colonists had known the peach in England, and

they began to bring in better varieties. For example, it is recorded that George Robbins of Easton, Maryland, imported seeds of peaches in 1735. The Chinese Cling, from which many modern varieties have been derived, was brought to New York state from England in 1850. The Chinese Cling had been brought from China to England a few years earlier and was found to be superior to many peaches grown in England at that time. From these crude beginnings our modern-day peaches have been developed. Horticulturists are constantly searching for new and better varieties; by experimental breeding, many wonderful peaches have been made available to us.

In Colorado, the peach came as the farmers came. Both pits and plants were transported across the plains and planted at various places in the state. The Western Slope was early recognized as suitable for peach growing. Some, like Mr. Harlowe on Rapid Creek near Palisade, had only a few trees. Others planted extensive orchards. William Pabor, in 1883, laid out several large tracts near Fruita and planted them to peaches and other fruit trees. Charles Steele and Elam Blain are credited with producing the first apples and peaches in Grand Valley — their orchards were 2 or 3 miles east of the present site of Grand Junction and were planted about the same time as those of Pabor. Rose and Miller of Colorado

Springs also had a large peach orchard east of Fruita in the early days.

The Colorado peach has developed into a widely known and very valuable crop. Varieties have changed — one seldom hears of Early Golden Yorks, Early Stump, or Hale's Early Crawford; but the famous Elberta, Polly, Halehaven, and other Hale varieties, have become household words.

Peaches are not recommended for the Eastern Slope of the Colorado Rockies or for the plains. Neither soil nor climate is suitable. Peaches generally bloom very early in the spring and the late frosts destroy the fruit.

Also, the trees often winterkill. However, there are bearing peach trees to be seen in Denver and other "forbidden" areas. These are usually trees which receive some protection and a little extra care. They seldom fruit every year, but some years they may produce very good crops. If you live in Denver or on the Eastern Slope or on the plains and want to try a peach tree, keep in mind that it is a gamble. If you are willing to take the risk and disappointment of no crops some years and at best a short-lived tree, try a peach — otherwise, plant cherries, plums, or apples, which have been proved dependable for this area.



MOTHS are not Hummingbirds

KATHARINE B. CRISP

NOW AND THEN someone reports seeing in his garden late in the evening a hummingbird flitting from flower to flower. This darting creature was probably a moth, sometimes smaller and sometimes larger than a hummingbird.

In June there were gray moths everywhere, hiding in the daytime, emerging in the evening when the lights were on. The larval stages of these dull-colored moths are familiar as cutworms. In general, moths do little harm; it is the larvae, which are voracious eaters, that destroy foliage and crops. Moths can be distinguished from butterflies by the position of their

wings. When at rest they are folded down over the body, whereas the butterfly holds its wings erect. Moths fly at night, butterflies are active in the sunshine. Both have sucking mouthparts.

When the hour of dusk approaches, stand by a bed of primroses or phlox and watch the hawk moths coming as swiftly as meteors through the air, hovering for an instant over the blossom, probing into the sweet depths of another, and then dashing off again so quickly that the eye cannot follow them.

Among the larger moths, the most common in Colorado is the white-lined

sphinx. The long, pointed front wings have an oblique light bar crossed by fine white hairs and the hind wings are pink with black basal and marginal bands. Another large moth is the great tobacco or tomato moth which has mottled wings and yellow spots on each side of the abdomen. The larvae feed on the leaves of tomato plants and Virginia creeper.

The larvae of hawk moths are usually large, greenish, with oblique stripes on the sides of the body and with a horn near the tail end. When in motion, the body is long, tapering at each end. When at rest, the head and anterior segments are drawn back, the rings telescope into one another, and the anterior portion of the body is often raised. The habit of assuming this posture, suggesting a resemblance to the Egyptian Sphinx may have prompted the name.

The larvae pupate in a cell deep under the soil. Other species spin a loose cocoon among damp fallen leaves and pupate at the surface. The pupae are as remarkable as the larvae. A few genera have the proboscis (sucking tube) enclosed in a sheath which is separate along the great portion of its

course from the adjacent wall of the body, resembling the long handle on a slender pitcher. In the moth the sucking tube, coiled like a watch spring, lies between the maxillary mouthparts. To draw nectar from the flower the coil is unrolled to reach the depth of the flower and the liquid is drawn up by rolling back the coil.

Rivalling the sphinx moths in size are the large silk moths. In the foothills and mountains of Colorado a common species is known by the plum-colored inner half of the wings. The eastern representative of this moth is the Cecropia. The light green larva has conspicuous red and yellow prominences. It is found on the chokecherry, on the boxelder, and on a variety of other trees. The cocoon, about 3 inches long, is spun among the leaves. Efforts to reel the silk have met with little success.

The hummingbirds are the smallest of all birds. They have long needle-like bills for sipping nectar from flowers. The wing motion is so rapid that the wings look like blurry gauze. These little creatures are active in the daytime. And hummingbirds are not moths.

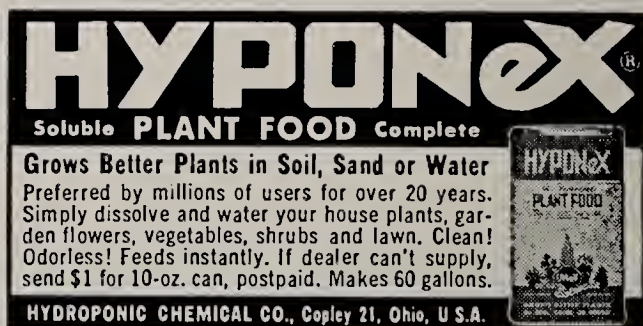
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PLANT SALE *and* AUCTION REPORT

ROBIN LONG

DECKED OUT like a French street scene, amid gay umbrella tables, the Plant Sale and Auction was a wonderful success. Held on the Mall at the Cherry Creek Shopping Center, May 25 and 26, the Sale attracted buyers undaunted by the usual bag of tricks of our spring weather, first blowing hot and changing to a chilling cold on Friday night. Raves from one and all went to the distinctive garden statuary. Selection was made easier by the grouping of unusual shrubs, herbs, perennials, annuals, orchids, and houseplants. There are still available sturdy redwood tables or benches for sale at Botanic Gardens House.

We wish to express our sincere thanks to those named below, and to the anonymous donors, who helped so graciously to make this event a big success.

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The Green Thumb

A Publication of Denver Botanic Gardens

SEPTEMBER 1962

25 CENTS



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SEPTEMBER

Vol. 19

No. 8



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•••••

THE COVER

GRASS

•••••

Notes and Notices

ORCHIDS — Make a date to see the Annual Orchid Show presented by the Denver Orchid Society on October 6 and 7, Saturday and Sunday, at Botanic Gardens House, 909 York Street. The Show is open to the public from 10:00 a.m. until 5:00 p.m. There is no admission charge.

HATS OFF — Sincere thanks from Denver Botanic Gardens are extended to the following people:

1. the members of *The Green Thumb* Editorial Committee under the chairmanship of Mr. M. Walter Pesman. We appreciate the faithfulness with which they have met the responsibility of wheeling and dealing for the material needed to compose this publication.
2. Mr. Clyde Learned for all of the time and energy he has expended on behalf of the membership roster of Denver Botanic Gardens.

CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent

Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT BOTANIC GARDENS HOUSE

SEPTEMBER

- 5 — Wednesday, 10:00 a.m., Colorado Federation of Garden Clubs State Board Meeting
7:30 p.m., Botany Club
- 6 — Thursday, 10:30 a.m., Mountain View Garden Club
7:45 p.m., Orchid Society
- 10 — Monday, 10:00 a.m., Judges' Council
- 12 — Wednesday, 7:30 p.m., Landscape Contractors
- 14 — Friday, 9:30 a.m., Southern Hills Garden Club Coffee
8:00 p.m., Rose Society
- 17 — Monday, 4:00 p.m., Denver Botanic Gardens Board of Directors Meeting
- 18 — Tuesday, 1:00 p.m., Rocky Mountain Area African Violet Council
- 19 — Wednesday, 9:30 a.m., Fun with Flowers Workshop
- 20 — Thursday, 10:00 a.m., "Around the Seasons" Garden Club
- 23 — Sunday, 2:00 p.m., Colorado Cactophiles
- 25 — Tuesday, 1:00 p.m., Ikebana International Flower Arranging Class

- 26 — Wednesday, 7:30 p.m., Landscape Contractors
- 27 — Thursday, 1:00 p.m., Civic Garden Club, Division A, Luncheon
- 28 — Friday, Colorado Federation of Garden Clubs Tea and Tour

OCTOBER

- 2 — Tuesday, 12:30 p.m., Mountain View Garden Club
- 3 — Wednesday, 7:30 p.m., Botany Club
- 6 & 7 — Saturday and Sunday, 10:00 a.m. to 5:00 p.m., Annual Orchid Show
- 8 — Monday, 10:00 a.m., Judges' Council
- 10 — Wednesday, 7:30 p.m., Landscape Contractors
- 11 — Thursday, 8:00 p.m., Rose Society
- 16 — Tuesday, 1:00 p.m., Rocky Mountain Area African Violet Council
- 17 — Wednesday, 9:30 a.m., Fun with Flowers Workshop
- 18 — Thursday, 10:00 a.m., "Around the Seasons" Garden Club
- 25 — Thursday, 1:00 p.m., Ikebana International Flower Arranging Class
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KENYA'S Bug-Killing DAISIES

THE PYRETHRUM BUREAU, INC.

WHEN THE AMERICAN homemaker or gardener presses the button of an aerosol, or dairymen, food factories, or truck gardeners use any of the insecticides cleared as "safe" for usage around or on people, their food, or their pets, the chances are that an African grower of pyrethrum is deriving some benefit from his unique crop.

Few scientific developments in the fantastic world of science in the years since World War II, the wedding of American industrial technique to the ingenuity of a far-away country, have effected such pin-pointed benefits to human beings. Furthermore, the work is entirely divorced from monopoly and has been accomplished without the expenditure of one cent of American dollars on subsidized programs.

Even the pyrethrum flower is almost as anonymous as it seems to be mysterious. No American insecticide bearing it carries the name on its label. The only identity for these insecticides is the word "pyrethrins," the scientific name for its bug-killing content, printed in fine type on the labels of insecticides made from pyrethrum.

Actually the pyrethrum flower is as old as man's memory. It has always been a garden favorite. As "insect dust" it was used for centuries in a limited fashion to kill insects that happened to crawl over it. A generation of laboratory work was required to discover the method of extracting the pyrethrins from the pyrethrum blossom and then to turn the liquid extract into powerful insecticides blended with syn-



Field of pyrethrum flowers
at Molo, Kenya

ergists to increase their potency and with oils, dusts, and other materials as carriers.

The long and successful quest was impelled by pressing need for modern weapons against the ever-growing insect world and by the known fact that no chemical insecticide has been invented, or is foreseen, that combines all of the unique qualities nature put into pyrethrum.

Pyrethrum is termed a fast insecticide because it knocks down on contact the greater part of the worst insects, including flies, mosquitoes, and roaches. It is termed "safe" because in sprays and mists normal exposure does not hurt warm-blooded life. Finally and possibly most important, since it is not absorbed into the digestive tracts of insects, there has not been developed immunity to it such as has marked experience with chemicals like DDT.

The anomaly in development of pyrethrum is that the very chemicals that



Picking pyrethrum flowers

once threatened to displace it now must be supplemented or again be replaced by pyrethrum to round out the protection demanded by modern health programs in the United States and around the world.

Kenya's role as the principal supplier by far of the precious pyrethrins was no more accidental than the developments in the laboratories. The pyrethrum flower is not even native to Africa, but it was introduced to Kenya 25 years ago in a program to develop cash crops to help that country develop a better economy. The high plateaus, abundant rainfall, and abundant native farmers offered an opportunity to foster mass production of the plants. Europeans pioneered the development, while training African helpers, not only in the fields but in laboratories and extraction factories, built respectively to improve strains and to keep abreast of modern developments.

Thus pyrethrum became the leading "cash crop" of Kenya. It yields less

farm income than coffee and tea, which abound in Kenya, but the farmer makes his first income within months of planting the slips of the young plants, instead of needing to wait and finance himself for years while developing coffee or tea plantations.

By a coincidence of climatic variations, the Kenya crop of pyrethrum ends its early cycle in late spring, just as the peak of demand for insecticides arrives in the northern hemisphere. Throughout the winter, the extract factories at Nakuru extract from the flowers the minute quantity of pyrethrins, which comprise only about 1½ % of the total weight of flower heads, and move these overseas to market in drums of refined oil. Here the pyrethrins are blended into hundreds of different formulations and types for as many different usages.

No manufacturer has a monopoly on the precious pyrethrins. The Kenya supplies are augmented by smaller quantities from many lands, but Kenya currently supplies three-fourths or more of this country's requirement.

Back in that small country, facing the Indian Ocean, the sales are counted in only a few millions of dollars, but they are the principal support and stable foundation for the future for more than 30,000 African families who grow pyrethrum independently and for another 125,000 families who work for the European and African landowners or in the warehouses and extraction factories where the crops are processed.

It should be noted that pyrethrum is not an all-purpose insecticide. The very rapid disappearance that prevents the leaving of residues in food and largely inhibits the development of immunity by insects makes it less valuable than some chemicals for usage in fields and other places where long life is desired. On the other hand, its short life makes

it about the only insecticide approved by health authorities for usage on food after harvest and in processing plants and home kitchens where food is actually being prepared.

While pyrethrum is termed a “safe” insecticide, it also should be remembered that there are no insecticides sold in the United States which, when properly used according to directions on their labels, are unsafe. It is only carelessness or neglect that causes needless tragedies by those insecticides which sometimes are blamed. It just so hap-

pens that in creating pyrethrum and its precious pyrethrins modern science was given by nature one element which, when prepared for usage, is not harmful in itself to man and warm-blooded animal life.

Thus the unique symbolism of the one word “pyrethrins” on American insecticide labels—the uniting of a priceless boon to our health and an invaluable guarantee of stability and welfare to African families whom most Americans will never see.

T · H · E

M. WALTER PESMAN

G · A · M · E

NAME

Penstemon has reference to the odd fifth stamen of the genus.
The specific names of *Aralia pentaphylla* and *Acanthopanax pentaphyllum* have reference to their compound leaves of five leaflets.

P.S. The botanical name for snowberry sounds formidable, but once you analyze its meaning you won't forget. (See next issue of *The Green Thumb*.)

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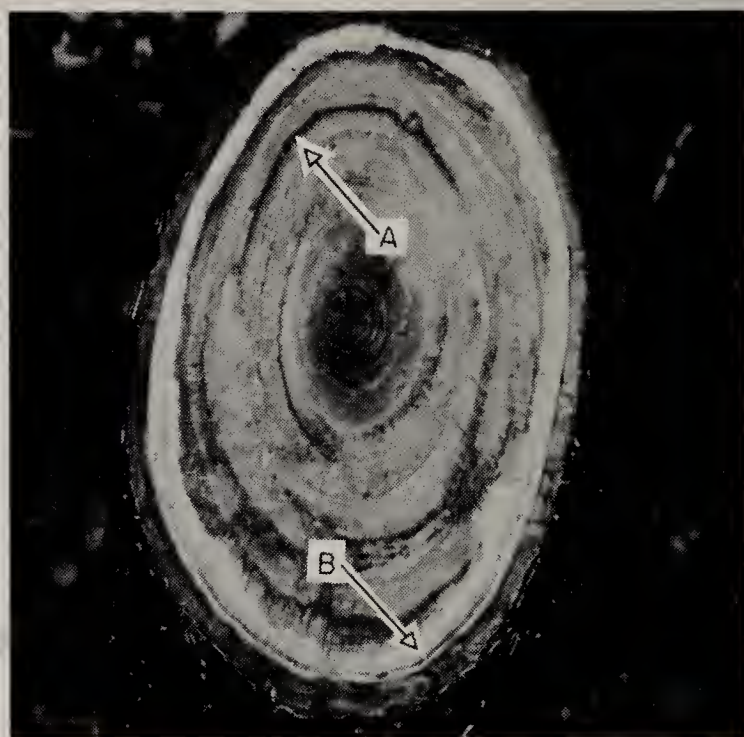
WETWOOD of Siberian and OTHER ELMS

J. C. CARTER

Illinois Natural History Survey
Urbana, Illinois

WETWOOD OF ELM, caused by the bacterium *Erwinia nimipressuralis*, is a chronic disease that appears to be present wherever elms grow. Wetwood of other kinds of trees, including apple, birch, fir, hemlock, hickory, linden, maple, mountain ash, mulberry, oak, plane tree, poplar, redbud, and willow, is not known to be caused by *E. nimipressuralis*. Most Siberian elms (*Ulmus pumila*) and American elms (*U. americana*) are affected by wetwood, as indicated by the bleeding or fluxing through wounds. This fluxing is especially conspicuous during the growing season and occurs frequently through wounds in branch crotches. Wetwood is a disease mainly of the heartwood and older sapwood. However, it produces many external manifestations that are conspicuous, unsightly, and detrimental to the tree. These external manifestations include fluxing through wounds, yellowing of foliage followed by premature defoliation, scorch of foliage, wilting of foliage, dieback of wilted branches, and general decline of entire trees.

Wetwood Symptoms.—In elm, wetwood is most conspicuous in the older sapwood and heartwood. In trunk cross-sections, it may appear as dark brown streaks or broken bands of discoloration in one of several wood rings, or as discoloration limited to portions of a single wood ring (Fig. 1). The



(Photograph courtesy of Illinois Natural History Survey)

Fig. 1. A section of elm trunk affected with wetwood shows dark brown diseased areas in isolated portions of some wood rings (as at A) and brown streaking in part of the current-season wood ring (as at B).

diseased wood is water-soaked, and sap oozes out when the wood is cut.

Gas is produced in large amounts in wetwood-affected tissues by the action of fermenting bacteria on carbohydrates and other materials in the sap. When this gas is confined in the trunk, abnormally high sap pressures develop. Pressures up to 60 pounds per square inch have been recorded (Fig. 2). However, pressures of 5 to 10 pounds per square inch are common in wetwood-affected trees. The gas contains approximately 46% methane, 34% nitrogen, 14% carbon dioxide, 5% oxygen, and 1% hydrogen.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 2. Abnormal pressures develop in the diseased wood. Highest pressures develop in trees that do not flux, as shown in this picture.

Sap accumulates under pressure in the diseased wood and produces the water-soaked condition which gives rise to the name "wetwood." This sap contains phosphorus and an abundance of potassium. These materials appear to be present in the sap as carbonates. The sap and the water extract from affected wood of diseased elms are alkaline, while water extracts from healthy sapwood and heartwood of normal elms are acid in reaction.

Flux.—The most conspicuous damage caused by wetwood is the bleeding or fluxing of the fermented sap through trunk wounds. Abnormally high pressures caused by fermentation force the accumulated gas and sap out of the trunk through wounds made by the removal of branches, through cracks in crotches and trunks, and through other trunk injuries. The exuding of sap is commonly called "fluxing." The sap or flux is colorless to tan as it oozes out of diseased wood but turns dark upon exposure to air. When abundant bleeding occurs, the flux flows down the trunk, wetting and soaking large

areas of bark. When the flux dries, it leaves a light gray to white incrustation on the bark. Fluxing may occur from April to December. However, it is most conspicuous during July, August, and September, when the wetwood organism is most actively fermenting sap and producing abnormal pressures in the diseased wood. Fluxing usually ceases during January, February, and March. However, the wounds through which this fermented sap has flowed can be detected by the gray to white incrustation of dry flux on the bark (Fig. 3).

The exuding wetwood flux is toxic to the extent that it is capable of retarding or preventing callus formation, and it frequently kills the cambium at the base of a cut where a branch has been removed and around the trunk cracks through which it flows. Young shoots directly above the fluxing re-



(Photograph courtesy of Illinois Natural History Survey)

Fig. 3. Drying of the wetwood flux leaves a light gray to white incrustation that appears as streaks on the bark of trunks and branches.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 4. Fluxing sap of wetwood-affected trees is sufficiently toxic to retard or prevent formation of callus and to kill bark at the base of pruning wounds. Airborne bacteria, yeast, and other fungi may grow in the sap exuding through wounds and produce gray to brown, foamlike, ill-smelling, slimy masses called slime flux.

gions may wilt. Foliage and young shoots, and grass at the base of an affected tree, may be killed if the flux drops on them. Growth of air-borne bacteria, yeast, and other fungi in the fluxing sap may produce gray to brown, foamlike, ill smelling, slimy masses around wounds. This slimy material is commonly called "slime flux" (Fig. 4).

Other symptoms may develop when the fluxing sap spreads to current-season wood and is transported in the sap stream. These symptoms may develop as yellowing, scorching, and wilting of leaves, dying of branches, and general decline of entire trees.

Yellowing. — Leaves on some trees may droop and turn yellow but not wilt. Many leaves that turn yellow may fall prematurely during late July and August. This yellowing of foliage is not easily differentiated from yellowing which results from adverse climatic conditions. It does not result in any

noticeable effect on the growth of the tree.

Scorch. — Foliage scorch resulting from wetwood appears as browning of tissues, usually between the veins but occasionally along the margins of leaves. These symptoms appear most frequently during late July and August. Many of the scorched leaves may drop prematurely. However, scorch does not result in any noticeable effect on the growth of the tree.

Wilt. — Foliage wilt occurs on elms affected with wetwood when sufficient quantities of the toxic sap that has accumulated in the trunk wood is carried into the branches. (Fig. 5). The sap spreads through the current-season spring wood in the branches. Leaves on the affected branches first curl upward along their margins, then the petioles become flaccid, and finally the leaves droop. Curl and droop are followed by wilt. Some leaves that wilt rapidly may drop from the trees while still green. Other leaves that wilt rapidly may take on a dull, greenish-brown or somewhat bronzed ap-



(Photograph courtesy of Illinois Natural History Survey)

Fig. 5. Foliage wilt of elm caused by wetwood sap can be distinguished from other foliage wilt diseases only by laboratory analysis. This elm shows wilt caused by wetwood.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 6. Some branches on which the foliage wilts may die, as shown in this picture.

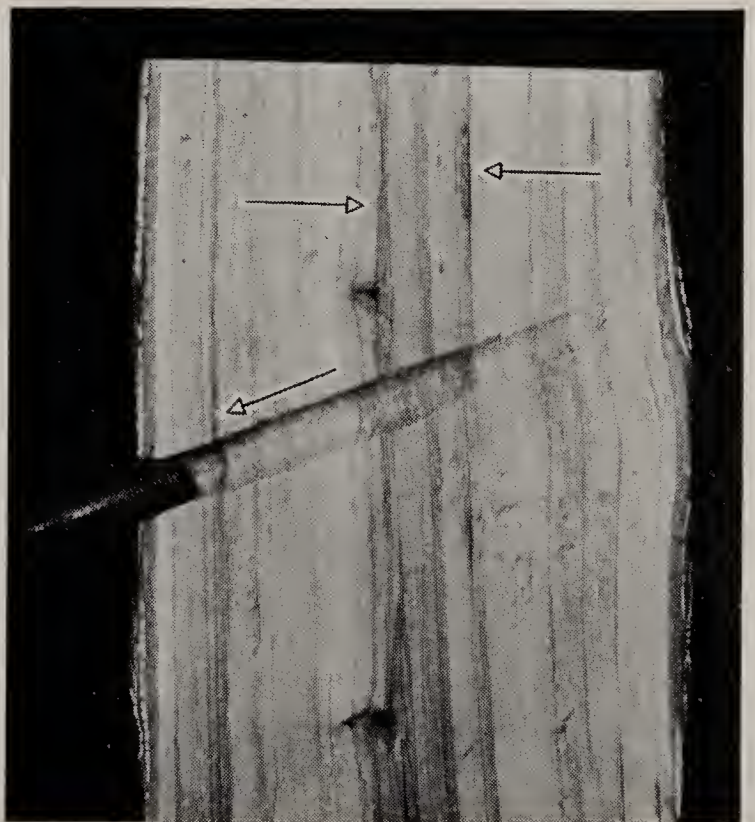
pearance by the time they fall. Many of the brown leaves may remain on the affected branches for several weeks.

Dieback and General Decline. — Conspicuous foliage wilt is frequently followed by dying back of affected branches (Fig. 6). This dieback may be limited to only tip portions of branches, or entire branches may die. In some trees, very few branches die during a single growing season and the trees recover in succeeding years. In others, a few scattered branches die annually and the trees show gradual decline over a period of years. In large, old trees, this gradual decline may be attributed to old age when actually it is one phase of the wetwood disease.

Treatment. — Trees fluxing, wilting, or showing other symptoms of wetwood should be examined for wounds

through which toxic sap or flux is exuding. Such wounds may be in branches or in the trunk below the affected branches. A hole bored in the branch or trunk below the wound will allow the flux to escape and will prevent further oozing of flux through the wound. A drain pipe, if properly inserted in the hole, will prevent the flux from coming in contact with the cambium and flowing over the outer surface of the bark (Fig. 7). This treatment prevents additional toxic sap from being taken into the current-season wood and should prevent additional wilt.

There is no hard and fast rule for determining where the drains should be installed. In some cases, a drain installed in the base of the trunk of a large elm has stopped the fluxing of several wounds along the trunk. Effective drainage of the accumulated gas and sap from the diseased wood is usually obtained by installing drains a



(Photograph courtesy of Illinois Natural History Survey)

Fig. 7. This section of an elm shows a hole bored at the proper angle to insure effective drainage and the drain pipe so inserted that it does not penetrate diseased wood (arrows) and interfere with drainage.

short distance below the fluxing region. Fluxing wounds, where branches have been removed, usually can be drained by boring a hole, $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter, 6 to 14 inches directly below the fluxing region. Fluxing cracks in trunks and in branch crotches may or may not respond to the same treatment. In some cases, it may be necessary to bore several holes before satisfactory drainage is obtained. The crack in the wood may not be directly behind the crack in the bark through which the sap is fluxing. These bark and wood cracks may be so located that a hole bored directly beneath the bark crack will not be directly beneath the wood crack, and effective drainage will not result. As a rule, it is best to bore the hole to one side and about 6 to 14 inches below the fluxing crack. This hole should be directed toward the probable location of the crack in the wood or toward the center of the heartwood. Drain holes should have sufficient slant to allow the wetwood sap to flow out, and they should extend through the heartwood to within a few inches of the bark on the opposite side of the trunk.

Many branches on which the leaves have wilted from wetwood do not die but produce a new crop of leaves later in the current growing season or during the following growing season. Since the wetwood organism is usually widespread in the trunk and older branches, pruning wilted branches will not eliminate the disease. Pruning can be delayed until the following spring, when

only the dead wood should be removed. This delay in pruning frequently may prevent destroying the ornamental value of the tree. Feeding will stimulate more vigorous growth and may aid wetwood-affected trees to overcome the adverse effects of the disease.

Precautions that may be taken to prevent spreading the wetwood bacterium from diseased to healthy trees should be considered. Tools that come in contact with wetwood-affected tissues or with the fluxing sap should be treated with a disinfectant such as denatured alcohol to prevent spread of the bacteria to healthy tissues. Preventing trees from fluxing will prevent insects from feeding on the bacterium-infested sap and possibly carrying the organism to wounds on healthy trees.

Trees treated with chemical compounds should not be pronounced cured unless the wetwood organism in the treated trees has been killed. Whether a tree has been cured can be determined by laboratory tests on specimens from the water-soaked heartwood and older sapwood. Suitable samples for laboratory tests can be obtained with an increment borer. If the laboratory test shows that the bacterium is still alive in the diseased wood, although fluxing has been stopped by the treatment, the tree has not been cured; only the fluxing has been arrested. It should be kept in mind that some wetwood-affected trees overcome fluxing, at least temporarily, by sealing the wounds with callus growth.

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? ? ? PETE Ponders ? ? ?

Dear Pete,

I know your garden is on the rocks, too. Will you give some appropriate bulbs for fall planting?

ROCKY

Dear Rocky,

If you seek major attractions in the rockery, you'll plant minor bulbs. Of course, you must keep the flowers in scale with the size of the garden. Ordinary garden tulips and daffodils are usually too tall, too stiff, or too formal. However, the giant botanical tulips, such as Red Emperor, with their short stems, give a riot of informal color.

The autumn crocus, not *Colchicum*, begins the season about Thanksgiving. The tiny species crocus and the common crocus bloom in the spring. Winter aconite and the little tulips, *Tulipa turkestanica* and *T. dasystemon*, often bloom in February. Later come the *T. kaufmanniana* hybrids, *T. clusiana*, the exciting *T. acuminata*, and other wildling tulips.

The little bulbous irises, *Iris dandfordiae* and *I. reticulata*, are jewels. Scillas come in various colors and shapes. Snowdrops, snowflakes (much taller than snowdrops, with green dots on each white petal), and the little blue and white striped *Puschkinia* sp. may delight you.

Dwarf daffodils include Hoop Petticoat, Angel's Tears, February Gold, March Sunshine, and pure white Thalia. Flowering onions range from 6 inches to 3 feet; several are appropriate.

If you have moist shade, try mari-



posa lily and dogtooth violet, if you can buy them. Excuse me, please, I must get a napkin to wipe the drool off my chin!

Dear Pete,

George Kelly and others say, "Water your lawn less frequently and more thoroughly." I agree, but then come the hot dry winds that burn the grass on top.

I presume the answer is more fertilizer. What and when do you suggest.

WINDBLOWN

Dear Windblown,

Georgious Kelly is thoroughly right. Henry Gestefield, in charge of Fitz-



simons Hospital grounds for 12 years, suggests you fertilize only if you want to mow often. Humus incorporated at the time the lawn is built encourages deep roots and retains moisture readily. Your problem, and mine, gives emphasis to the need for proper soil preparation.

I fear fertilizing would increase the susceptibility to burn. Aeration, mechanical or by foot, might solve your problem by encouraging water and roots to go downward.

Deep-waterer Gestefield advocates using a sharp pencil to test water content in the soil. Water at least 1 hour at a time in each location or until you can easily push the pencil its full length into the ground. Water again when the pencil fails to penetrate. If the ground slopes, he suggests you water for a short interval and then repeat the watering process after a brief time, because "water will penetrate three times as rapidly in moist soil as in dry ground." He adds that if you water only briefly each day Arkansas and Missouri will reap nice showers.

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***DELICIOUS* and SCARY**

JANE SILVERSTEIN RIES

WHILE VACATIONING, during the last weeks of August 1961, after heavy rainfalls all summer, at our mountain cabin at Glenelk, about 40 miles west of Denver, the most fascinating, glamorous, and astonishing performance of earth jewels popped up every day. I've seen nothing like it in the 40 years I have been going to the cabin. But here were the oddest shapes and sizes in orange, cerise, yellow, Alice blue velvet, metallic violet, and, of course, white and brown. I had always collected and consumed the common mushrooms and puffballs and called the rest toadstools. But like Alice, I became curiouser and curiouser. Where had they been all these years?

I found that there weren't very many members in our camp who had the least confidence in me or my findings, for rumor has it that one can easily be done in by being a mycophagist! A friend kindly loaned me her valuable May 1920 *National Geographic* magazine with an excellent article on mushrooms. We practically wore out the article trying to identify these strange forms.

So I was brought to do a bit of book research. Here is what I found: The word fungus is the Latin name for mushroom. The 250,000 species of fungi include molds, mildews, rusts, smuts, mushrooms, and toadstools. The latter two interest us for the present. They are regarded as plants, even though they are totally unlike the com-

mon green plants; they do not have chlorophyll. They are either parasitic or saprophytic, that is, they thrive on living or dead matter. It is the fruiting body of the fungus that we see and use.

Inviting anyone to become a mushroom eater is tantamount to asking that person to become somewhat of a botanist, assuming, of course, that one has no ulterior motives on his or her life.

Do not accept mushrooms from a self-styled expert, even if you have to disoblige a dear friend. Learn the subject yourself. Those who are not sufficiently interested to acquire the necessary knowledge should do without wild mushrooms for the rest of their lives, bearing in mind that, so far, there is no "player attachment" to the study of mushrooms.

The confusion of whether a structure is a toadstool or a mushroom has come about by thinking incorrectly that if it is edible it is a mushroom, if poisonous, a toadstool. With this criterion we would collect and throw into the mushroom basket all species as fast as they might receive approval and we would cast into the toadstool basket all uncertain, untried, and dangerous forms. On the basis of such distinctions applied to European conditions, there might be on the markets of Munich, Germany, about 50 species for sale as mushrooms, since this number is approved by the authorities. But in Berlin, at the dictation of stricter



PUFFBALL

rules, the number of recognized mushrooms would be half the number recognized in Munich. The best usage sanctions mushroom as a comprehensive term applicable to any and all of the higher fleshy fungi, whether good, bad, or indifferent with respect to edible qualities. There are hundreds of edible fungi and only a few dozen described as deleterious.

The earliest reference to toadstools is "tadstoles" in 1398 and "froggestoles and venomous meetes". A toadstool might serve as a resting place for a sedentary batrachian; possibly the explanation is in the old belief that toads were venomous. Mushrooms have also been called toads' hats or toads' bonnets, with the belief that fungi grow in places where toads abound and give shelter to them. Let's consider toadstool a term which might well be held sacred to the fairy tales of mushrooms.

Fungus eating was common in Greek and Roman times. Euripides, 480-406 B.C., gives the account of a trip to Icarus where a woman and her family gathered fungi and were strangled by eating them. Claudius Caesar employed special collectors to gather mushrooms, causing the wrath of Sen-

eca, who said, "... how many men to labour for a single belly." Thus Caesar fell victim to a dish of fungi prepared by his wife Arrippina and her son Nero. This mushroom is now known as *Aminita caesarea*.

Two hundred years ago a professor of Botany at Cambridge University wrote, "Whoever has been accustomed to eat mushrooms will certainly allow them to be one of the greatest Dainties the Earth affords."

As accessories, for relish or variety, mushrooms are undoubtedly valuable, but they can never take the place of meat nor rank high as an essential food. The proportion of water to solid matter is very great, 70-90%. They have some nitrogen and a little protein. Half a cup of canned mushrooms has 85 calories; twenty-five medium-sized fresh mushrooms have 100 calories. After World War I, a German family now living in Boulder relates how they scoured the woods and ate all the mushrooms they could find, for food was scarce and they were starving. They got sick sometimes but fungi helped to keep them alive.

The only mushroom cultivated extensively in Europe and America is the field or meadow mushroom, *Agaricus campestris*. Mushroom is derived from the old French *moucheron*, which means moss in English. Among consumers of French canned *champignons*, there seems to be the feeling that this term is used only for the cultivated forms.

The earliest account of growing mushrooms commercially was in 1650 in France. Today in Paris they are cultivated in enormous quantities in dark underground cellars to a depth of 60-160 feet in 20 miles of beds. A single grower will sell from 300 lbs. to 3,000 lbs. per day. Beds bear from

six to eight months; then spent manure is taken out for gardens. Good success depends on compost, spawn temperature, about 54 degrees, sanitation, good drainage, ventilation, and moisture.

At the beginning of 1900 there were complaints in the United States of the unsatisfactory state of our mushroom industry; our growers had to depend on foreign spawn. About 3 million pounds of canned mushrooms were imported annually until a better way of getting spawn was worked out. Through the Pasteur Institute, 1913-1918, 38 million pounds were imported in addition to the large output of our own growers and quantities of wild species which were consumed. So there must be a great demand for these useful, easily recognized, and delicious members of the plant kingdom.

As to the glamour gal of the mushrooms, the truffle is it. It is the best known underground fungus because of

its high repute in cookery. These "trubs" were cause for wonder to the ancients. Pliny called it a marvel of nature that any plant could spring up and grow without roots.

There are two guides in searching for truffles that have been known for centuries: 1. About the time the truffles are ripe, certain flies, ready to lay their eggs, hover a foot or more above the soil in mid-morning and early evening. Poachers lie flat on the ground facing the sun to get a better view of them. 2. In early autumn, when truffles are ripening, those growing near the surface upraise the soil causing it to crack. The strong perfume makes their presence known to wild animals that like them, such as pigs, wildcats, wolves, bears, deer, goats, badgers, rabbits, squirrels, and mice. This shows that what in man is usually regarded as a certain refinement of taste is fairly widespread.

The natural instinct of the pig for



finding truffles has been utilized. The first reference to this use of pigs was in the 1470's, when villagers used them by strapping up their mouths and by tying a cord to a hind leg. Pigs can detect the scent of truffles up to 50 yards away. They begin hunting when they are 2 years old and are at their best after 3 or 4 years. But they give good service up to 20-25 years. They are rewarded with acorns, beans, maize, or carrots and carry on without distraction.

Dogs, mostly a poodle type which originated in Italy, are also much used, but they have to be specially trained. At the beginning of the 18th century these dogs were imported to Germany where the possession of a "truffelhund" seemed to have been regarded almost as a badge of nobility. If dogs are used, only one or two, at most, hunt together. Otherwise, serious work is likely to succumb to canine gambols. Dogs are not so sure and quick nor so obedient and alert as pigs.

Ninety percent of the truffle beds grow under beech trees and keep producing for 10 to 15 years. Ten percent grow under cedar, hazel, hawthorn, and sycamore trees. The chief competitors are the truffle beetle, the red squirrel, the rat, and the mouse. The growing season for truffles is from October to February.

Truffles lie under the ground from 3 to 24 inches. The normal weight of a truffle is a few ounces, rarely 2½ lbs. There are three kinds of truffles: the black, the red, and the white. The color depends on the degree of ripeness. Black is the ripest and the best. They are seldom eaten alone but are used for flavoring in pies, ragouts, and sauces; for stuffing of poultry; and for garnishing dishes. When they are in good condition, they have an agreeable aroma and are light and elastic. They are best fresh; much flavor is lost when they are preserved. They are almost inordinately esteemed by epicures. Their price is expensive; a 1½ oz. can sell for \$3.85. Fortunately the passion for truffles is an acquired one.

Here is a quotation from James Thurber:

"Mushrooms is a veg-e-table;
to detect them few are able.
If in Heaven you awaken
then you'll know you were
mistaken,
And the ones that you have eaten
weren't the ones you should have
eat!"

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PLANT BREEDING

PART IV

MORAS L. SHUBERT

University of Denver

WERE YOU surprised to find that when a dihybrid purple-flowered sweetpea that depends upon combinations of complementary genes is self-pollinated that the seed produced will carry the characteristics for purple flowers and white flowers in the ratio of 9 to 7? This is the solution to the problem in the August issue of *The Green Thumb*. You should have found nine combinations that had both the "P" and "C" and seven that were as follows: ccPP, ccpp, CCpp, (2) Ccpp and (2) ccPp.

In numerous other cases there are similar examples of complementary genes, but combined gene expression may take other forms, as mentioned earlier. There are cases where certain traits are intensified when several sets of genes are involved and when all present are identical. This suggests that if we had a fairly satisfactory plant variety that perhaps its desirable traits could be amplified by increasing the number of genes that governed those traits.

Actually there is a means by which we can increase the repetitions of genes! This is done by chromosome increase to some multiple of the basic set number. Ordinary plants, with

their two sets of chromosomes are diploids, but we can produce triploids and tetraploids rather easily. In some cases the number of chromosomes per cell has been raised to many times the basic number. It has been known for a long time that when rapidly growing plant tissues are treated with solutions or pastes containing the poisonous alkaloid colchicine, that peculiar changes occur in the ordinary mitotic division of cells. The newly formed chromosomes do not separate as they should, but instead they form into a nucleus with perhaps twice the proper number. A lily with 14 chromosomes per cell might produce cells with 28 chromosomes. This would mean that each of the genes contained in the nucleus would be repeated four times. If we were to select buds from tissue that had these excess chromosomes and propagate new plants from them, it would appear that we could control chromosome number and thus the traits of the progeny almost at will.

Unfortunately, as so often happens when we have discovered what seems to be a "magic wand" that will solve all our problems, we are soon disillusioned. There has been much disappointment in the general application of

the principle of chromosome doubling. Many plants produced in this manner do not show any improvement over their parents with the normal number of chromosomes, and some actually show unsatisfactory abnormalities. A few successes have been scored, however, and most gardeners are now familiar with the rather spectacular tetraploid snapdragons, as one example.

It probably would not be worth mentioning this phase of plant breeding were it not useful in some way. And there certainly is one very useful application of it. When two different species of the same genus are crossed the resulting interspecific hybrid progeny are usually sterile. If we can propagate these sterile hybrids vegetatively by cuttings, grafting, etc. we may not be concerned about their sterility. But if it is desirable to get seed either for propagation purposes or else for further breeding and selection, something must be done to improve the fertility of the hybrid. The reason for sterility in such hybrids is that during

the reduction division when pairs of mated chromosomes separate prior to pollen and ovule formation, the chromosomes from two different sources are highly incompatible. Thus they do not separate neatly into two groups to form the first stages of sex cells. But if we take one of these sterile hybrids and double its chromosomes, then each chromosome will "find" an identical mate and go through the necessary pairing that must precede reduction division. This has been one of the most useful techniques in making what first appeared to be rather impossible combinations.

In our next study of this subject we will summarize the principles that have been discussed and talk about some of the things to look for in our own plant breeding experiments.

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PESTICIDE HAZARDS

in Our Gardens

ROBERT B. FINLEY, JR.

Denver Wildlife Research Center
Denver, Colorado

EVER SINCE man first began cultivating the soil with a digging stick, he has been engaged in a continuous struggle to bend nature to his own desires of productivity and beauty. In place of the prolific diversity of highly adapted plants and animals filling all niches of the native flora and fauna he has substituted a few kinds of food and ornamental plants of value to him. Small wonder that his efforts to cultivate a single crop or to nurture the simple beauty of a landscaped garden require a constant suppression of nature's undesired productivity.

Among man's most effective means of controlling nature's bounty for his own use are chemical pesticides. These have vastly increased the thoroughness of pest control that could be achieved and greatly reduced the labor required. However, these benefits have been gained at the expense of new hazards and problems. All pesticides are, after all, poisons to some animals and plants, and their safe use requires an understanding of their toxicity and overall hazard to man, plants, and animals.

Most modern herbicides or weed killers are of very low direct toxicity to man and animals and are used in such low concentrations that there is little risk of dangerous amounts of residue getting into food. But like all chemicals, they should be handled cautiously in accordance with instructions on the label, and containers

should not be left within reach of small children.

A greater hazard with use of herbicides is that of drift from the area being treated onto adjacent beneficial plants that may be highly susceptible to the material. To minimize harm from drift, the herbicide should not be applied at dose rates higher than specified, the application should be made at the time and in the manner recommended, and it should not be applied under windy conditions.

Insecticides, as normally used, are less apt to cause harm from drift than are herbicides, but in other respects they are generally more hazardous. The same precautions of use mentioned above should be followed, and special care should be taken to prevent breathing the spray or dust, to keep it off the skin as much as possible, and to wash with soap and water after the job is completed. It is true that occasional contact with most insecticides is probably harmless, but the lack of unpleasant symptoms cannot be grounds for confidence that all is well. Harmful effects are more likely to be felt some time after repeated exposure to an insecticide, especially one used indoors without good ventilation. Most insecticide labels contain warnings against excessive exposure but, unfortunately, the most important information may be printed in the smallest type.

The most widely used insecticides

fall in two major groups, the chlorinated hydrocarbons and the organic phosphates. The former have long residual effectiveness and may be accumulated in the body if ingested with food and water. The latter, as a class, have rather short residual life and are not easily accumulated in the body, although their physiological effects can be cumulative from repeated exposures within a period of a few weeks.

The more highly toxic chlorinated hydrocarbons include endrin, dieldrin, aldrin, and heptachlor. Some of the less toxic ones are DDT, methoxychlor and chlordane. The more dangerous organic phosphates include parathion, Phosdrin, and TEPP (tetraethyl pyrophosphate). Much less toxic ones are malathion, Dibrom, Kelthane, and Tedion. Endrin, parathion, Phosdrin, and TEPP are too dangerous, in my opinion, for use by anyone but a trained pest control operator.

When any insecticide is applied out-of-doors its possible harm cannot be judged by its relative toxicity alone. Equally important are the rate of application, the stability or residual life, and the degree of accumulation in plant or animal tissues. The scope of harm is further influenced by the formulation of the chemical used, the food habits and behavior of wild species exposed to it, the timing with respect to migration and nesting, the extent of area covered by the application, and the schedule of repeated applications.

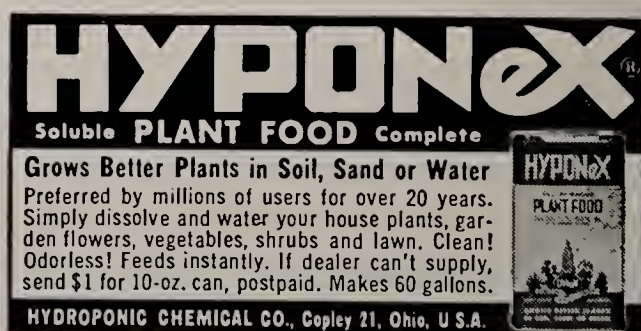
Even for DDT, which has been in large scale use for nearly 20 years, we do not yet have sufficient knowledge of the above factors to be able to anticipate some of the indirect effects of large-scale aerial applications on natural communities of wildlife.

Many of the answers can only be learned after an insecticide has been

used on a large scale for several years. Research now in progress is teaching us much about the effects of many pesticides on wildlife, but such research still lags far behind the rate of development and use of new pesticides.

Although much deplorable and unnecessary harm has been caused by some of the large-scale pest control programs, and loud outcries of alarm have been raised in consequence, there is little reason for the average home gardener to give up his proper use of pesticides on this account. Most losses of songbirds in urban and suburban areas seem to have resulted from organized city-wide spray programs, rather than from the hand sprayers of individual gardeners. To help minimize any harmful effects each home gardener should use chemical controls only after he has observed that damage is actually being done by a pest, correctly determined the cause of the damage, considered other possible control methods such as pruning when these may suffice, and chosen the safest pesticide recommended for the job to be done.

When advice is needed, a competent source is the nearest county agricultural extension agent, who is well versed in the pest problems of suburban gardens as well as farm crops. Each gardener who follows these guidelines can also aid his community by insisting that city or state officials engaged in pest control responsibilities follow the same standards of concern for protecting the resources of all our people.



Carnation DISEASES

J. L. FORSBERG, *Plant Pathologist*
Illinois Natural History Survey, Urbana, Illinois

Reprinted from the Illinois State Florists' Association Bulletin, No. 187, November 1958, and No. 188, December 1958.

THE CARNATION is one of the most widely grown of all flower crops. It is subject to a number of diseases, several of which can become so serious that crops cannot be profitably grown without rigid disease control.

FUSARIUM WILT

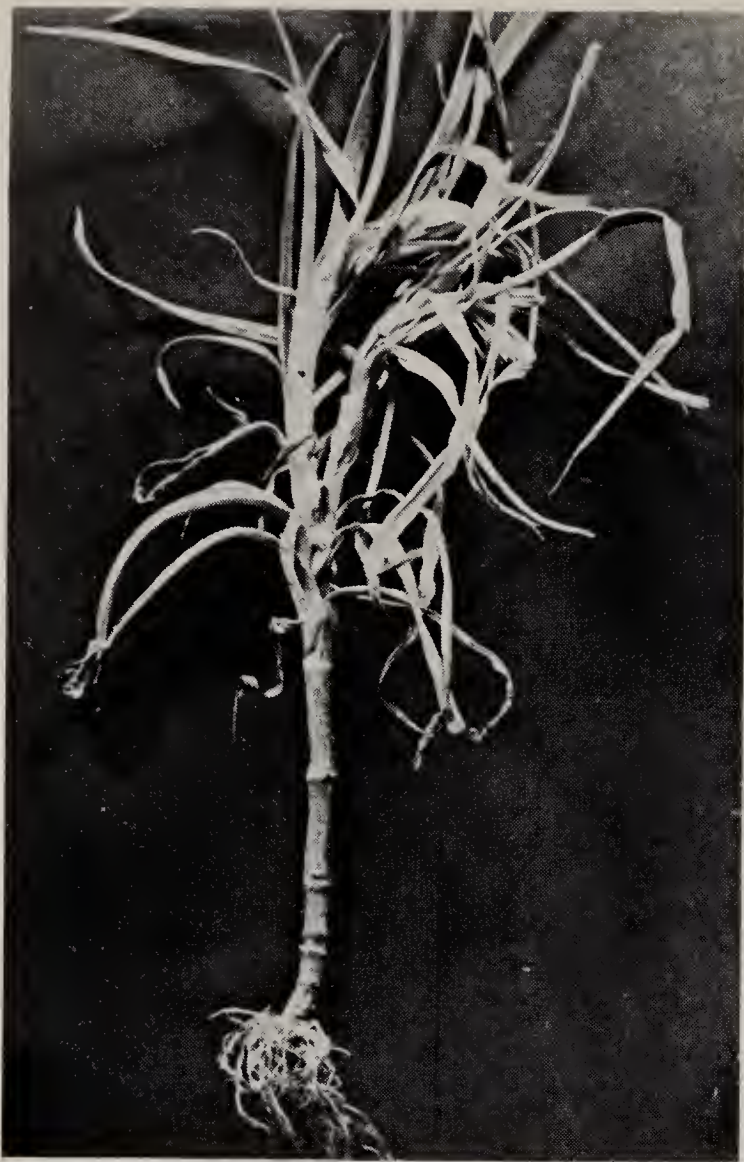
Fusarium wilt, caused by *Fusarium oxysporum dianthi*, has been responsible for more losses to carnation growers than any other disease. Although it is much more serious in some areas than in others, it occurs nearly everywhere carnations are grown.

Symptoms — Plants may show symptoms at any stage of development. The first indication that a plant is affected with Fusarium wilt is a slow withering of the shoots. Often this condition is apparent on only one side of the plant. In young plants this results in distortion due to the tendency of the plant to curl to one side (Fig. 1). The wilting and withering of the shoots is often accompanied by a change of color. The normal deep green color of the leaves and stems changes first to a lighter gray-green and finally to a pale straw-yellow. If the stem of a diseased plant is split, a brown discolored streak may be seen in the vascular tissues. Such streaks often extend from the roots to the uppermost parts of the stem. The root system remains intact unless the plant has been attacked by one of the root-rotting organisms or the bacterial wilt organism. Symptoms of Fusarium wilt develop most rapidly and become most severe during the high temperatures of the summer months.

Control — Control of this type of disease is rather difficult, but far from impossible. The first step is to make certain that the plants from which cuttings are taken are absolutely free of the disease. This is sometimes difficult because symptoms of wilt are usually not much in evidence during the cooler months when cuttings are taken.

One of the best ways of obtaining healthy cuttings is to establish and maintain disease-free mother blocks for the production of cuttings. Once such blocks are established, a source of healthy cuttings is always available if reasonable care is taken to avoid recontamination.

The primary problem in this connection is in establishing a completely healthy mother block. The most reliable and effective way of doing this is the cultured cutting method. This method makes use of laboratory culturing technique to determine if the cuttings are free from the wilt organisms. Because most growers do not have the time or facilities for using the cultured cutting method of obtaining disease-free stock, they may resort to another method. Those who are not fortunate enough to be able to buy cultured cutting stock from a specialist who is using this method can best establish healthy mother blocks by the indexing



(Photograph courtesy of Illinois Natural History Survey)
Fig. 1. Young carnation plant affected with *Fusarium* wilt.

method. By this method all plants used for propagation purposes are given numbers, and complete records are kept so that all cuttings can be traced back to their mother plant. Any line of plants that develops disease is discarded, including the mother plant.

The second step in controlling *Fusarium* wilt is to insure elimination of the causal fungus from the propagating benches and from the soil in which the carnations are finally planted. The most satisfactory method of doing this is by steam sterilization. In this connection, it should be pointed out that most of the methods which have been substituted for steam sterilization are usually unsatisfactory and should be resorted to only when steam is not available.

The year-around indoor culture is the only method by which plants can

be grown in disease-free soil at all times. Many field soils contain *Fusarium oxysporum dianthi* as well as other pathogens, especially after carnations have grown there. Obviously fields cannot be steam sterilized, so growers who use the summer field culture method must expect to lose part of their plants each year because of *Fusarium* wilt and other diseases picked up in the field.

To cope successfully with the *Fusarium* wilt problem the carnation grower should keep the following points in mind: (1) *Fusarium oxysporum dianthi* can live in the soil as well as in the carnation plant; (2) plants may be infected for some time before they show disease symptoms; (3) the fungus can be carried from one crop to the next in the cuttings; (4) a carnation plant can become infected in any stage of its development; (5) control of the disease consists of eliminating the causal fungus from the planting stock as well as from all soil in which plants are grown; (6) after the causal fungus has been eliminated, the grower must be constantly on guard to avoid recontamination.



(Photograph courtesy of Illinois Natural History Survey)
Fig. 2. Carnation plant affected with bacterial blight.

BACTERIAL WILT

Symptoms — Sudden wilting of the tops or some of the branches is the characteristic symptom of bacterial wilt caused by *Pseudomonas caryophylli*. In some plants, wilting occurs first in one or more branches on one side of the plant. In other cases, the entire plant wilts suddenly. Wilted branches dry, turn gray-green and finally tan or brown. Distortion due to the tendency of the plant to curl to one side as described for Fusarium wilt is not evident if the plant is affected with bacterial wilt (Fig. 2).

Internally, the stems of wilting plants are yellowish to brown. When the wilting is confined to one side of the plant, the discoloration in the basal part of the stem is usually restricted to the side on which wilting appears. The bark on the lower parts of the stems of infected plants disintegrates and becomes soft. When this decayed bark is broken away, the discolored wood of the inner stem is sticky to the touch. This stickiness of the inner stem is an important characteristic in diagnosing bacterial wilt.

The root systems of wilting plants are rotted (Fig. 3), most of them remaining in the soil when the plant is lifted. The inner tissues of affected roots are discolored yellowish to brown like the stem. The root tissues gradually disintegrate and become soft, exhibiting the same sticky character as the stem tissues. This sticky character of disintegrating root and stem tissues distinguishes bacterial wilt from the other wilt and root rot diseases.

Control — The causal bacteria enter the carnation plant through the roots and basal part of the stem. The disease is spread in much the same way as Fusarium wilt. The control measures outlined for Fusarium wilt will also control bacterial wilt. If cuttings are



(Photograph courtesy of Illinois Natural History Survey)
Fig. 3. Carnation plants with rotted roots associated with bacterial wilt.

treated with root promoting substances, powders, rather than liquid forms, should be used.

VERTICILLIUM WILT

Symptoms — Plants affected with Verticillium wilt, caused by the fungus *Verticillium albo-atrum*, show wilting and drying of the leaves and shoots similar to symptoms caused by Fusarium wilt. Vascular discoloration may be seen throughout the stem collar and in wilting shoots, but it is not as prominent as the discoloration associated with Fusarium wilt. There is no later development of tissue rotting as in Fusarium wilt.

Control — Methods of control are the same as for Fusarium and bacterial wilts.

FUSARIUM STEM ROT

Symptoms — Carnations are most susceptible to attacks by the stem rot

fungus, *Fusarium roseum cerealis*, in the propagative stage and, to a lesser extent, immediately thereafter. Thus, the most important losses from this disease occur in young stocks. Infected plants wilt and die from a stem rot at the base. Lesions at the soil line or below develop inwardly from the outside. Often there are pink or red discolorations on the edges of the lesions. There is no vascular discoloration.

In older plants the symptoms are much the same. They may be complicated, however, by symptoms incited by other pathogens which frequently are associated with the stem rot organism. In older plants it is not uncommon to find the roots rotted and sloughed away to the root head (Fig. 4).

Control — Use healthy, vigorous propagating material. Steam sterilize the propagation medium, benches,



(Photograph courtesy of Illinois Natural History Survey)
Fig. 4. Carnation plant affected with *Fusarium* stem rot and root rot.

tools, etc. If mother blocks are used to produce cuttings, the mother plants should be sprayed periodically with captan. Select cuttings as high as possible on the mother plants. When watering, reduce splashing as much as possible. Avoid high humidities. Dip the cuttings for 5-10 minutes in a solution of 2 teaspoons of Pano-drench 4 in 3 gallons of water with a small amount of spreader added. Stick the cuttings in the rooting media immediately.

RHIZOCTONIA STEM ROT

Symptoms — Foliage of plants affected with stem rot, caused by the fungus *Rhizoctonia solani*, becomes pale, gradually losing its green color. This is accompanied by wilting. A slimy wet rot of the bark takes place at the soil line. The fungus passes into the woody tissues to the pith. The rot in the cortex is more or less dry or corky in nature. Sclerotia may be formed in the center portions of the stem.

Control — Growers who use year-around indoor growing and steam sterilize their soil rarely have trouble with *Rhizoctonia* stem rot. Terraclor applied at the rate of 1 lb. 75% wettable powder to 800 square feet is effective in preventing sterilized soil from becoming re-infected with *Rhizoctonia* or in halting the further spread of established infestations. Semesan drench is also effective.

RUST

Symptoms — Reddish brown pustules form on the leaves (Fig. 5) and stems. The pustules are caused by numerous spores of the fungus *Uromyces caryophyllinus* which form below the epidermis and break through. Individual leaves may be killed by the rust or whole plants may be injured to the extent that they are unprofitable.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 5. Rust pustules on carnation leaves.

Control — Rust spores require water to germinate; therefore, keeping the foliage dry is the most important factor in rust control. Use cuttings which are free from rust because the conditions in a cutting bench are very favorable for the development and spread of rust. In cases of severe outbreaks of rust, use of a fungicide spray of zineb or captan becomes advisable. It may be necessary to spray once a week to stop the spread of the disease.

BACTERIAL LEAF SPOT

Symptoms — Dead, sunken oval-shaped spots (Fig. 6) appear on leaves affected with bacterial leaf spot caused by *Phytophthora blight*. When viewed by reflected light, the centers of these spots are pale brown with purplish concentric zonations. If viewed by transmitted light the outer zones of the spots appear water-soaked and yellow. Under conditions of high humidity the bacteria may ooze out in small drops on the surface of the lesions. The spots average about 1/2 inch in length and may cover the entire width of the leaf. With numerous infections, the spots tend to coalesce.

Several spots usually cause death of the leaf. This killing begins with a yellowing that occurs in advance of the water-soaked margin around the older lesions. The leaf gradually turns straw-yellow, withers, and dies, while the spots retain a rusty brown color. The disease progresses from the lower leaves upwards. Symptoms always have been observed to appear first on the lower leaves under both field and greenhouse conditions. While this is primarily a foliage disease, infections sometimes occur also on the stems and flower buds. In cases of severe infection the plants may be killed. When infection is less severe, flower production may be reduced for some time.

Control — Light infections can be cleaned up by picking off and burning diseased leaves. Keep the foliage as dry as possible. Water the plants early in the day, preferably on bright days, so that there will not be too much dampness about them at night. Keep water off the foliage as much as possible. Application of sulfur dust has given satisfactory control in some cases.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 6. Carnation leaves affected with bacterial leaf spot.

ALTERNARIA BLIGHT

Symptoms — Symptoms of blight, caused by the fungus *Alternaria dianthi* occur on the leaves, stems, and occasionally on the flowers. Infections which develop on either surface of the leaf are first evident as tiny purple spots. These spots soon develop a broad yellow-green border; later as the more or less circular spots enlarge, a small light brown to grayish, dead, sunken place appears in the center of each. With further enlargement the dead center becomes proportionately much larger, surrounded by a narrow outer yellow-green border, and in some varieties by a broader inner purple border. Frequently, several expanding lesions coalesce, resulting in large irregular dead areas (Fig 7). Finally the healthy tissue between spots turns yellow and withers so that the entire leaf is killed. The discolored diseased areas become covered with a black layer of spores, especially under moist atmospheric conditions.

Branches are infected most frequently at the nodes. Stem lesions are at first confined to the outer tissues and to one



(Photograph courtesy of Illinois Natural History Survey)
Fig. 7. Carnation leaves showing *Alternaria* blight lesions.



(Photograph courtesy of Illinois Natural History Survey)
Fig. 8. *Alternaria* lesion girdling the stem and causing death of the portion above.

side of the stem, but later they usually extend through the inner tissues and girdle the stem (Fig. 8). The affected stem tissue is sharply defined from the adjacent healthy tissue and has the appearance of a dry brown rot. Black crusts of spores form on the dead areas, and some of the black deposit remains long after the branch has died. The branches and leaves finally become completely dried out and assume the color of straw.

Another characteristic of this disease is the mottled appearance of the terminal leaves on stems that have lesions or cankers below. The center terminal, followed shortly by the outer terminal leaves on an affected shoot, first becomes light green in color and then develops this peculiar mottled appearance (Fig. 9). This symptom should not be confused with the mottling that accompanies the virus diseases. Gradu-

ally these and the remaining leaves of the shoot turn yellow. Wilting and subsequent death follow.

Control — Control of *Alternaria* blight involves, first of all, the prevention of primary infections in the cutting bench. Thus, the selection of clean cuttings from healthy plants is of utmost importance. Plants kept in a greenhouse during the summer remain practically free of infection without the necessity of spraying, and, in a wet season favorable for infection in the field, may produce more than twice as many flowers as plants grown in the field.

If field culture cannot be avoided a thorough spray program should be practiced. Spray applications should be made at weekly or ten-day intervals starting soon after transplanting in the field and continuing until just prior to benching. The fungicides zineb, captan, ferbam, and ziram can be used. Any of these materials is used at the rate of 1½ to 2 lbs. in 100 gallons of water. Because of the waxy leaves, use of a good spreader is necessary to obtain good coverage.



(Photograph courtesy of Illinois Natural History Survey)
Fig. 9. Yellowish mottling and ringspot patterns produced in upper young leaves when stem below bears *Alternaria* lesion or canker.

SEPTORIA LEAF SPOT

Symptoms — The fungus *Septoria dianthi* produces light brown spots with purple margins on the leaves and stems, especially on the lower portions of the plant. Small black specks, the fruiting bodies of the fungus, may be seen in the centers of these spots. Individual spots may enlarge or coalesce with other spots, causing death of the distal portion of the leaf.

Control — Same as for *Alternaria* blight.

FAIRY RING SPOT

Symptoms — Leaf spots develop on the leaves when fairy ring spot occurs. Minute black fruiting bodies of the fungus *Heterosporium echinulatum* appear in ring formation on these areas.

Control — Same as for *Alternaria* blight.

BOTRYTIS BLIGHT

Symptoms — The spores of *Botrytis cinerea* are produced in large numbers when the atmosphere is warm and damp. Under such conditions enough moisture collects in the opening bud to form an ideal environment for germination of the spores and growth of the fungus. Petals of affected flowers turn brown while in the buds or after the flowers have opened (Fig. 10). Frequently a number of affected petals are matted together by the growth of the fungus. If the weather remains warm and moist, the affected petals soon become covered with the gray growth of the fungus. A powdery mass of spores may be seen covering the surface of the fungus. If the weather suddenly becomes dry, the fungus usually will not develop further, but the affected parts of the petal become brown, dry, and brittle.

Control — Botrytis blight occurs only during periods of extremely high humidity. Control measures usually



(Photograph courtesy of Illinois Natural History Survey)
Fig. 10. A carnation flower affected with *Botrytis* blight.

are not necessary, but in houses where the disease has become troublesome it is advisable to cut and destroy affected buds as soon as they are noticed. Splashing water carelessly and drips from the roof should be avoided. Anything that can be done to reduce the humidity in the greenhouse will help control *Botrytis* blight.

BUD ROT

Symptoms — The interior of buds affected with bud rot caused by *Fusarium tricinctum poae* is brown, decayed, and usually moldy. The outer parts of the buds may appear almost normal.

Control — The disease is spread by the mite *Pediculopsis graminum* which carries spores of the fungus from diseased to healthy buds. Picking and burning all infected buds as soon as they are noticed, controlling the mites, avoiding excessive humidities, and removing all plant debris will control this disease.

ANTHER SMUT

Symptoms — Carnation plants attacked by anther smut, *Ustilago vio-*

lacea, are stunted in growth, with excessive axillary or side-shoot development that causes the plants to have a grassy appearance. Shoot growth on infected plants is generally weakened; internodes are short and leaves smaller. Flower bud production is increased on the main stems. Buds are short and squat in form and there is a marked tendency of the calyx tubes to split when the flowers open. Flowers on infected plants are rendered unsightly by production of large masses of purplish-black spores which replace the pollen normally produced in the anther sacs. The spores shed abundantly over the flower petals, give the petals a sooty-like appearance, and make the bloom quite messy.

Control — Remove and burn all infected plants as soon as they are detected. Propagate only from stock known to be entirely free from the disease.

GREASY BLOTCH

Symptoms — In plants affected with greasy blotch, caused by the fungus *Zygophiala jamaicensis*, the basal leaves lose their glaucous waxy bloom and appear greasy or shiny green; the middle leaves have greasy blotches with radiately fibrillose margins. Yellowish pimples develop in affected areas of stems and leaves. Under moist conditions tiny, thin, black, superficial fungus masses (stomata) are formed.

Control — The disease occurs only under conditions of high humidity. Control is achieved by eliminating these conditions.

PIMPLE

Symptoms — Pimple-like spots, thought to be caused by a form of the bacterium *Xanthomonas oryzae*, sometimes appear on leaves and stems of carnations. The pimples are about one millimeter in diameter and appear first



(Photograph courtesy of Illinois Natural History Survey)
Fig. 11. Fasciated shoots at base of carnation stem.

near the base of the leaf tips of the leaves. The pimples make their appearance first on the upper portions of the plant. Leaves of severely infected plants may shrivel.

Control — Use cuttings only from healthy plants. Avoid wetting the leaves when watering the plants.

FASCIATION

Symptoms — Many short, spindly branches develop at a node of a main stem. The masses of fasciated growth which resemble small brooms (Fig. 11) most commonly occur on the lower parts of the stems.

Control — Destroy affected plants. Propagate only from healthy plants.

VIRUS DISEASES

Symptoms — Four virus diseases are commonly found in commercial ranges. These are mosaic, streak, mottle, and

ringspot. Because the same plants may be carrying more than one of these viruses the symptoms are not always clearly defined. The virus diseases often are disregarded by commercial growers because the plants rarely are destroyed by these diseases. Losses result from reduced flower production and poor quality flowers.

The characteristic symptom of mosaic is a mottling of the leaves with light green irregular blotches (Fig. 12). This mottling makes diseased plants a lighter green than normal healthy plants. Mosaic shows in the flowers of colored varieties as lighter streaks that parallel the veins of the petals (Fig. 13).

Plants affected with streak have yellowish or reddish spots and streaks paralleling the leaf veins (Fig. 14). These spots are red on dark-colored varieties and yellowish or light pink on the white varieties. On dark red varieties the outer portions of the spots become purple. Many of the lower leaves on affected plants may become severely spotted, turn yellow, and die. Direct feeding injury caused by the aphid *Myzus polaris* resembles symp-



(Photograph courtesy of Illinois Natural History Survey)
Fig. 12. Leaves showing mottling characteristic of mosaic.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 13. Color breaking in carnation flower affected with mosaic.

toms of streak so closely the two are often confused.

Carnation mottle virus is common in most commercial carnations and is usually more prevalent than the other three virus diseases. It produces either faint leaf mottling or no symptoms. It causes faint streaking, chiefly on the backs of the outermost petals in red and pink commercial varieties.

Symptoms of carnation ring spot include irregular chlorotic spots and occasional chlorotic ring patterns. Some varieties show irregular gray or yellow spots and streaks in the leaves. Some leaf distortion accompanies these le-

sions; leaf margins are frequently waved or otherwise irregular.

Control — The mottle and ring spot viruses are transmitted on the knife used in cutting flowers or in making cuttings. The mosaic virus is transmitted by aphids but the method of natural spread of the streak virus is still unknown. All practices which interfere with transmission of viruses from diseased to healthy plants will help control these diseases. Such practices as breaking the cuttings from stock plants, refraining from trimming cuttings, controlling insects and establishing mother blocks from indexed plants are of great benefit.



(Photograph courtesy of Illinois Natural History Survey)

Fig. 14. Carnation leaves showing symptoms of streak.

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Annual Bluegrass

FRIEND or FOE?

CHARLES M. DRAGE

Extension Horticulturist

Colorado State University, Fort Collins, Colorado

ANNUAL BLUEGRASS, *Poa annua*, is seldom listed as a weed. It has little economic importance, but it certainly can be considered a weedy pest in lawns. It is a winter annual and normally begins growth in late summer and early fall from seed strains and lacks the creeping rhizomes. It also has shorter, broader leaves, and the color is a lighter green. The entire plant is smooth, and the leaves are shiny on the dorsal side. No other turf species can reproduce seeds even when mowed regularly at a height of $\frac{1}{4}$ inch. Seed is spread by wind and birds.

We readily recognize why it is a foe, but why is it sometimes considered a friend? It can be a friend in areas where the growing season is short and cool. In these areas it can provide good ground cover. It makes acceptable "winter grass" for lawns with summer grasses like Bermuda, zoysia, or crabgrass. It can be a friend by growing in areas, vacated by Kentucky bluegrass, during the early spring and late fall months. Perhaps it is more desirable than some other cool season weeds. It prefers shade. Where crabgrass is common, it frequently follows annual bluegrass. Crabgrass is a warm weather grass, and its seed will start germinating about the time the annual bluegrass reaches maturity and seeds. The best control is a healthy, dense stand and tight sod of Kentucky bluegrass, the result of proper feeding, mowing, and watering.

A thorough lawn renovation is desirable in early spring, followed by overseeding later in the spring. Dacthal evidently prevents the establishment of the seedlings in the fall.

Petroleum naphtha or special light aromatic oils such as Stoddard solvent sprayed on annual weed grasses will kill them, particularly in early stages of growth.

Temporary soil sterilants are frequently the answer to severely weed-infested bluegrass lawns. They kill the desirable as well as the undesirable plants. Dalapon at $\frac{1}{4}$ lb. dissolved in 1 gallon of water applied to the grasses in the infested area will kill all grasses. Dalapon will usually disappear from warm, moist soil in three to six weeks. Then the area can be seeded. Newer materials now available (example, Erase) will kill all plants and the area can be reseeded after a few days.

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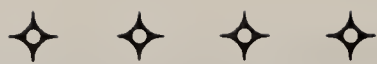
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The foliage is dull and leathery, brightening up a little in the fall. The fruit, not at all popular nowadays, is reddish brown and roundish and indented at the top; the calyx is permanent. The fruit should remain on the tree until late October or November and then be stored eye downward in a cool place. By the time it is "bletted," that is, half rotten, it is of pleasant acid flavor but not attractive to look at. It can be used for either jam or jelly.



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THE COVER

Autumn Arrangement
Cattails, Aspen and Chokecherry
Arrangement and Photograph by
Mr. and Mrs. Ray Turnure



CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent
Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT BOTANIC GARDENS HOUSE

OCTOBER

- 16 — Tuesday, 1:00 p.m., Rocky Mountain Area African Violet Council
- 17 — Wednesday, 9:30 a.m., Fun with Flowers Workshop
- 18 — Thursday, 10:00 a.m., "Around the Seasons" Garden Club
- 24 — Wednesday, 12:30 p.m., Civic Garden Club, Div. A., Luncheon Meeting
7:30 p.m., Landscape Contractors
- 25 — Thursday, 1:00 p.m., Ikebana International Flower Arranging Class
- 27 — Saturday, Men's Garden Clubs of Colo., Regents Meeting
- 28 — Sunday, 2:00 p.m., Colorado Cactophiles

NOVEMBER

- 1 — Thursday, 7:45 p.m., Orchid Society
- 5 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 6 } — Landscape Design School
- 7 }
- 8 }
- 7 — Wednesday, 7:30 p.m., Botany Club
- 12 — Monday, 10:00 a.m., Judge's Council

- 13 — Tuesday, 10:00 a.m., Herbarium Study Group
- 14 — Wednesday, 7:30 p.m., Landscape Contractors
- 15 — Thursday, 10:00 a.m., "Around the Seasons" Garden Club
- 19 — Monday, 4:00 p.m., Denver Botanic Gardens Board of Directors Meeting
- 20 — Tuesday, 1:00 p.m., Rocky Mountain Area African Violet Council
- 21 — Wednesday, 9:30 a.m., Fun with Flowers Workshop
- 25 — Sunday, 2:00 p.m., Colorado Cactophiles
- 28 — Wednesday, 7:30 p.m., Landscape Contractors
- 29 — Thursday, 1:00 p.m., Ikebana International Flower Arranging Class

DECEMBER

- 3 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 5 — Wednesday, 7:30 p.m., Botany Club
- 6 — Thursday, 7:45 p.m., Orchid Society
- 7 — Friday, 10:00 a.m., Civic Garden Club, Christmas Bazaar, Program and Pot Luck Luncheon
- 10 — Monday, 10:00 a.m., Judge's Council

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Notes and Notices

LANDSCAPE DESIGN STUDY COURSE II—The Second Landscape Design Study Course of the series will be given at Botanic Gardens House, 909 York Street, Denver, November 6, 7 and 8. Registration is at 8:30 a.m., classes begin at 8:45 a.m. All members of the Colorado Federation of Garden Clubs, Inc., Home Demonstration Clubs, park supervisors, nurserymen and others interested in landscape design are invited to take the course. Any person may register for the school but only Garden Club members are eligible to take the examination if they wish to do so. Instructors will be Miss Julia Andrews, Mr. S. R. DeBoer, Mr. Sam Huddleston and Mr. Stanley White. The topics to be covered are: November 6 — history of landscape design, influence of changing art forms, planting plans, roadside development, site preparation; November 7 — structures in the landscape, water in landscape composition, garden club and civic projects, use of trees and paved areas. Fee for this course is \$10.00 for Garden Club members and \$12.00 for non-members. Reservations must be in by Tuesday, October 23, to Mrs. W. R. Glenn, 10433 West 62nd Ave., Arvada, Colorado — Phone HA 4-1190.

GARDEN CLUBS DECORATE 1962 PARADE OF HOMES — Thirteen Denver area garden clubs provided floral decorations for the individual show homes. This new venture of decorating the homes was quite a challenge and met with apparent success. These floral displays were judged and the winners were: 1st prize—Westminster Garden Club; 2nd — Open Gate Garden Club; 3rd — Floral Arts Study Club, and Honorable Mention — Green Thumb Garden Club and Sunbonnet Garden Club. Other clubs participating were: Suburban Garden Club, Boulder Garden Club, Cheesman Park Garden Club, Mile Hi Corsage and Arrangers, Morning Glories Garden Club, Broomfield Garden Club, Kibitzers Garden Club and Mountain View Garden Club.

NEW OFFICERS ELECTED — The Botanic Gardens Junior Committee has elected officers for the coming year. They are: Mrs. Charles Arnold, President; Mrs. Schuyler Grey, Vice-President; Mrs. William McKinley Thompson, Recording Secretary; Mrs. William MacDougall, Corresponding Secretary; Mrs. John Peterson, Treasurer; and Mrs. Peter Burnett, Representative to the Board. Mrs. Arnold succeeds Mrs. Macintosh Brown as President.

MEET FLORA MEXICANA — Mr. M. Walter Pesman has announced the publication of his new book *Meet Flora Mexicana*. This is a companion volume to his popular *Meet the Natives*, with which all Colorado wild plant enthusiasts are familiar. *Meet Flora Mexicana* does much the same for the plants of Mexico as his earlier book does for the plants of Colorado. The aim of the new book is to acquaint people with the common trees, shrubs, vines and herbs that can be seen along the highways of Mexico. This book is written for the layman in Mr. Pesman's inimitably delightful style but is technically correct in all details. This book will be on sale at Botanic Gardens House as soon as the shipment is received. Prices range from \$4 to \$6 depending on binding.

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A

Kitchen Window Garden

HELEN MARSH ZEINER

DO YOU HAVE a sunny kitchen window? If so, why not be different and have a kitchen window garden in which to grow some edible plants for seasoning and garnishing? A number of herbs can be grown indoors in a sunny window, and what a pleasure it is to have fresh leaves at hand to use all winter long. Dried herbs simply can't compare! Since only small amounts of herbs are ordinarily used, a pot provides an adequate supply. Such a window garden is not only novel and useful but also very attractive, and it is certainly most appropriate for its location, the kitchen.

Perhaps you grow some herbs outdoors in the summer. If they still show signs of life, it is not too late to take up and pot divisions of these, being sure to cut the tops back severely. Lacking this source of supply, seeds or plants can be obtained from commercial growers.

Any standard house-plant soil is suitable for their culture. A good general-purpose soil is made of equal parts loamy garden soil, sand or vermiculite, and peat. Pots should have drainage holes, and in addition should be provided with a layer of pebbles or pieces of broken pot for drainage material. A small piece of thin cloth placed in the bottom of the pot does not interfere with the drainage of water and does keep the soil from washing out into the pot saucer. Clay pots are very good for herbs and seem appropriate in appearance in a kitchen window garden.

These plants require about the same care as other house plants. However, they will need frequent pinching back to keep them bushy and to prevent them from getting too big. Some of this pruning can be done when a bit of the plant is needed for use.

Among the herbs which can be successfully grown indoors the following are worth trying:

PARSLEY. If you transplant parsley from the garden, be sure to watch it carefully for a week or so to be sure that no aphids have hitchhiked their way into the warmth and comfort of your kitchen. If they do appear, they can be controlled easily enough with soap and water washings and hand removal, rather than with sprays which you might not wish to use on a food plant. If you plant parsley seeds, remember that they are slow to germinate. Keep the soil moist and the pot covered until they sprout — and don't give up — they *will* sprout. Parsley is not only attractive in the kitchen garden, but its foliage also makes it worthy of a place among your house plants in any part of the home. By the way, did you know that parsley was used by the ancient Greeks to crown athletic heroes? This is but one of the interesting tales about this common plant, which was important in the folklore of the Middle Ages. Most herb books include some of these stories. If you are not familiar with them, get some herb books and read the fascinating tales about parsley and all the other herbs as well. You will find that most herbs have long and interesting histories.

CHIVES. Chives transplant well, even late in the fall. Be sure to cut the tops completely back. Keep moist, and the little bulbs will soon put up another crop of leaves to be used wherever you want a mild onion flavor.

BASIL. If you like a bit of basil in tomato dishes, try a pot in the window garden. It will need pinching back to keep it shapely and in bounds, but can be successfully grown indoors.

ROSEMARY. Rosemary makes a nice addition to your collection, being very attractive as well as useful. Remember the old saying, "Rosemary for remembrance."

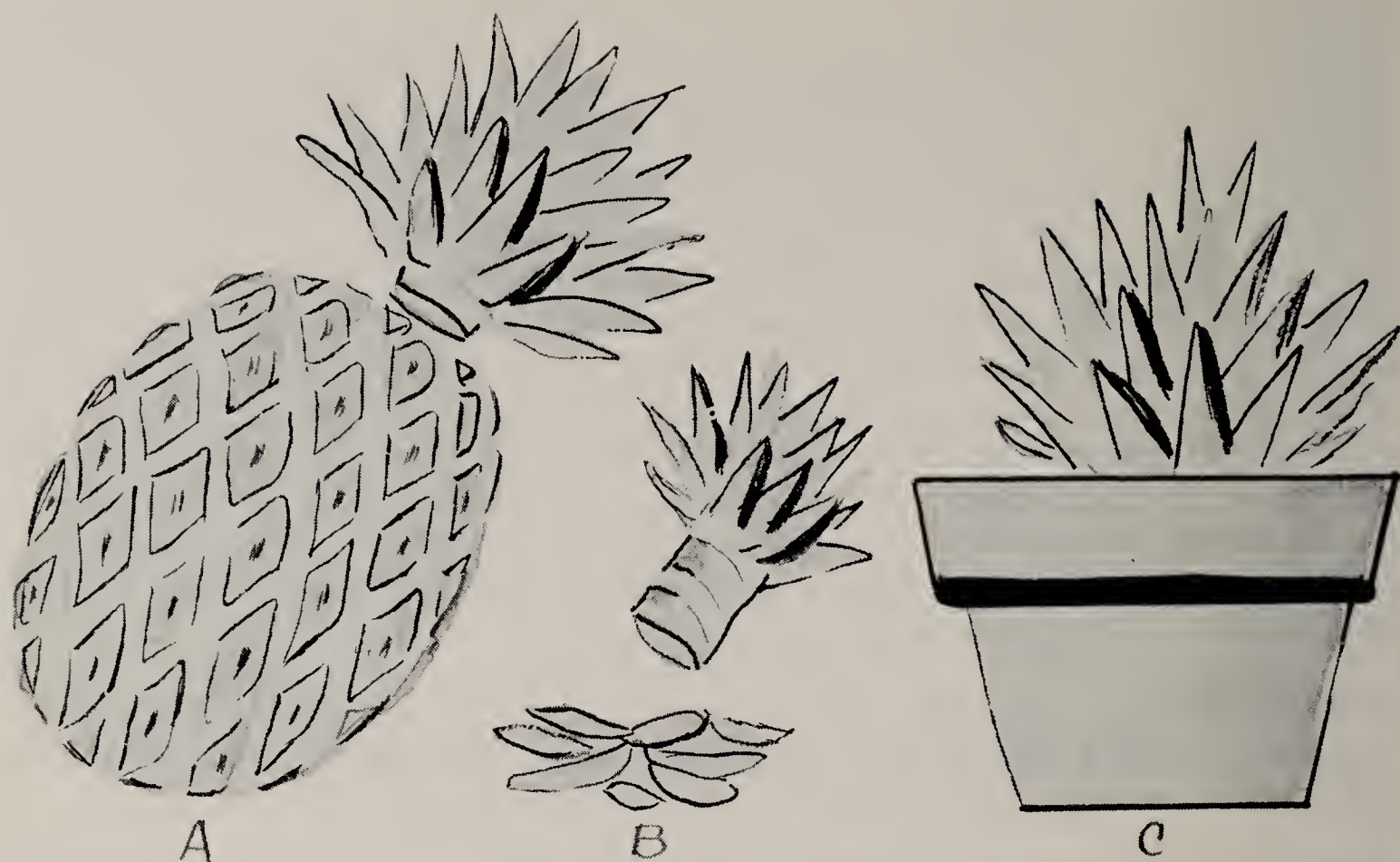
SWEET POT MARJORAM. As the name implies, this herb takes kindly to pot culture. Its pleasant scent makes it a nice plant to include in the kitchen window garden. Because of its fragrance, in medieval days marjoram was used for a strewing herb in milady's chamber.

TARRAGON. If you enjoy a touch of tarragon in salads, you will want to include a pot in the kitchen garden. Tarragon can become too large unless controlled by pinching back and pruning.

GARDEN SAGE. We may not ordinarily think of sage as a pot plant, but it can be grown successfully in this manner. Do not neglect pinching back! We value sage as a very useful flavoring herb; the ancients, however, believed it had medicinal value and cultivated it for this reason.

LAVENDER. Lavender, with its aromatic leaves, makes a novel and interesting addition to any window garden. It is not a difficult herb to grow under these conditions.

THYME. This is a little gem in the kitchen window garden. Since it tends to grow low, it does not require the diligent pinching back that some of the other herbs must have. If you like to use thyme, be sure to include a plant in your collection. It is one of the most satisfactory for indoor culture.



A. Cut top off pineapple.

B. Trim.

C. Place in pot of soil.

MINTS. Mints, such as peppermint, spearmint, pineapple mint, or orange mint can be adapted to the window garden. Since most of these are by nature rather large plants, they will require frequent pruning and pinching back, but their wonderful fragrance as well as their many uses make them well worth the trouble of keeping them controlled. Mints are water-lovers — keep them moist for best results.

SCENTED-LEAVED GERANIUMS. Perhaps geraniums are not herbs, but the scented-leaved varieties seem to belong in any well-equipped kitchen window garden. Perhaps because of its long use in cookery, the rose geranium seems to lead the list. The cut-leaved foliage is attractive to look at; the fragrance is pleasing; and a leaf added to an apple pie or a glass of apple jelly is a taste treat.

In addition to these edible plants, a few novel plants grown from vegetable tops or fruit seeds are fun and certainly belong in a kitchen garden. If you have never done so, try an avocado seed, a sweet potato vine, or a grapefruit plant. Cut the top off of a carrot, leaving about an inch of carrot, and keep moist for a short-lived but beautiful “fern.” Beets, parsnips, turnips, or other root vegetables work the same way. Carrots can also be hollowed out from the tip and suspended, stem end down, with the cavity filled with water. The tops will grow and make a pretty although short-lived hanging basket. Pineapple tops can be planted in soil. They will make long-lived foliage plants useful in many places in the home. If you have children, some of these novelty plants could be their share in the kitchen window garden. For a more detailed discussion of these novelty plants, see *IT’S FUN TO BE DIFFERENT* in *The Green Thumb* for December, 1955.

How to Make the Best Use of A Landscape Architect

M. WALTER PESMAN

"Oh, but I can't afford a landscape architect! They're too expensive! And anyway, I can get a free plan from a nurseryman, then it won't cost me anything."

THAT IS THE common refrain we hear again and again. How much of it is true? Even twenty-five years ago a landscape architect was generally thought of as a luxury, to be for the use only of people with large estates and liberal incomes. Some of these early estates in Denver were the John Evans home, the Weckbaugh home, the Boettcher home, the Gano estate, the A. C. Foster home, the Gates home, just to mention a few. Senator Phipps' place came a little later, and so did other large homes south and east of Denver.

What has happened to these estates? Most of them are passé. Even very rich people no longer can afford them, and good garden help is not to be had.

Some of these places are now semi-public: the Governor's home at 400 East Eighth Avenue, the Denver Botanic Gardens headquarters at 909 York Street. Others are waiting for a millionaire Texas oil-man.

In the meantime, what became of the landscape architects who were thought to depend on residential commissions? Public parks came in and needed their design ability. Some drifted into city planning and zoning. Others became aids to large nurseries.

Some starved in a genteel manner; some went to greener pastures such as California and Texas, where people in general had acquired a broader view of what landscape architectural services could provide.

Before going into specific cases it might be well to find out what the landscape architects themselves consider to be their field.

"The art of fitting land for human use and enjoyment" is a definition that is pretty generally accepted — often followed by: "in such a manner as to combine the greatest utility with the greatest beauty." As an art it resembles painting, sculpture, and architecture. In "fitting land" it includes any size area; in combining human use with enjoyment, and utility with beauty it accepts certain limitations, but also insists on aesthetic standards.

Examples of modern landscape architecture? A small back yard, an immense mountain park, subdivisions, memorial cemeteries, factory grounds, schoolgrounds, recreation areas, country clubs, roadside development, layout of world expositions, regional planning — there is no limit within the bounds of the definition.

In essence, the development of any landscape plan follows the same phases: appraisal of existing conditions and circumstances, a keen analysis of aims to be accomplished, and succeeding steps to change the present situation to desired

results. All planning follows this procedure. Landscape planning constantly keeps both utility and beauty in mind.

A competent landscape architect then needs to combine the imagination of the artist with the good common sense of an engineer or scientist; if he fails in either, the result is poor, or at best indifferent.

Enough of fundamentals. What the average home owner wants to know is how he can benefit from a landscape architect's training.

The problem resembles that of building a house. Some clearheaded young couples get the advice of an architect during at least part of the process. They may adapt a contractor's plan to their own use, or do much of their own designing. In any case consultation with a professional architect will often save them grievous mistakes and precious dollars.

Similarly many people prefer to do considerable planning in their garden layout: "I don't know anything about landscape design but I know what I want." Who hasn't heard a variation of that theme?

The case is greatly complicated because a young couple generally spends all they have or can borrow on the house, then have to do the landscape design on a shoestring.

"Free" plans are usually the most expensive ones. On a considerable nursery bill a nurseryman can afford to use some of his profit — legitimate nurserymen's profit — on donating a landscape plan. It may be a stereotype but not bad. In a few cases a large nursery hires a landscape designer who does a professional plan and gets paid by the nurseryman. This cost is part of the "hidden profit" of the legitimate

bill. The same system is used by interior decorators who give advice that is paid for in the cost of material.

Some artistically inclined people prefer to make their own landscape plan. They have access to a good deal of information; there are courses given in landscape planning, they can get advice from county agents, agricultural colleges, extension courses. Magazines have some good articles on home landscape design.

They may make mistakes, in fact are bound to, but they have fun making them. In the end they may develop a good garden plan in about the second or third venture.

Here is where the modern landscape architect has adapted himself (or herself) to modern circumstances. The "consulting" landscape architect has arrived on the scene.

In law we engage an attorney to save us from grievous errors. Such money is well spent if the attorney is an understanding soul.

Consulting medical men and psychiatrists are becoming part of our complicated lives. Businessmen have consulting efficiency experts, the military now has so many experts that we hardly know what everyone is doing or supposed to do. Evidently it pays off.

In conclusion then, take this hint from a professional landscape architect, one who has seen good results and poor results from many dealings with clients.

At some period of your planning get a landscape architect who has nothing to sell but his services, who has no interest — financial that is — in nurserystock, building material, redwood fences, or artificial rocks. Wait for this advice-getting until you are good and

ready. Actually living in a place shows you your needs and wants.

To get the most for his services prepare or find a "plot plan" of the grounds showing just where the house is located, what trees are where, the exact boundaries. This plan should be accurate and drawn to scale, say one inch representing four or five feet, or even eight feet.

Try some planning yourself, on tracing paper laid over the plot plan: it will help the consulting landscape architect to know what you have in mind. Get all the questions together about all you need to know, questions about size and shape of patio, about plant material, about ground covers, water features, rock gardens, and so on.

Then have the landscape architect come out and look over the ground

with you. In many cases he may be able to complete or change your rough plan, and give you sound advice about your misgivings.

In some cases it may develop into his making a complete landscape plan for you. And it is apt to result in a plan that will fit *your* taste, *your* pocketbook, *your* needs — not just a pretty picture.

Will it be "modern"? It will, if it fits your present-day needs and present-day taste. That is just the way in which "modern" art, "modern" music and "modern" sculpture were born: outgrowths of present-day needs and wants.

Good luck with your "do-it-yourself" venture, based on good, sound foundations! Fit *your* home grounds to *your* use and *your* enjoyment!

The Effect of Infrared Irradiation of Lawns

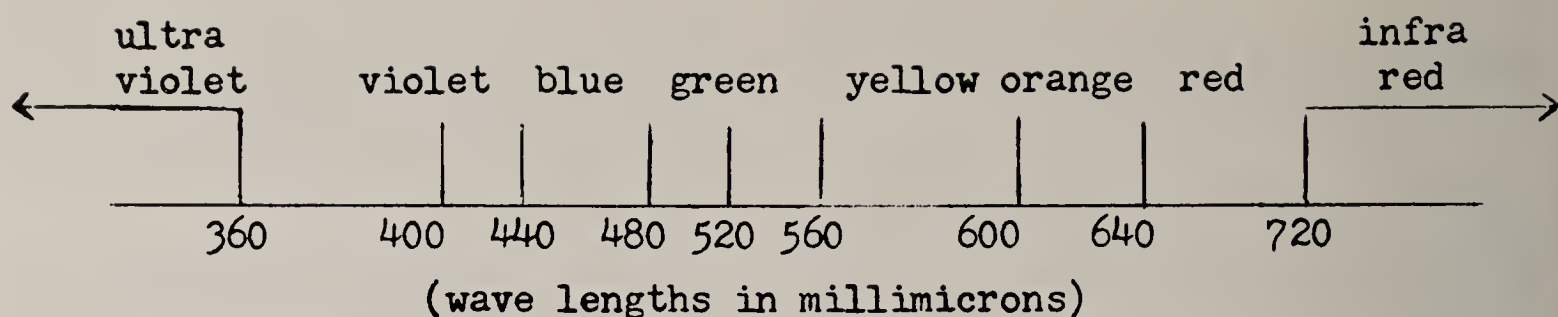
L. DAVID ENGHOLM

ON FIRST reading this title one might consider an article of this type of no value to the home gardener; but, before deciding, ask yourself if there is a section of grass in your lawn which consistently dies out during the winter for no apparent reason.

Without going deeply into the science of physics and botany, from which I might not be able to extricate you, much less myself, there are a few more or less elementary laws of light that we can all understand and can put to good use.

By using a glass prism we can spread out the white light into the "spectrum," a band of color ranging from violet through blue, blue-green, green, yellow, orange, red, and deep red. The colors of the spectrum are familiar in the rainbow, which is a result of the splitting up of white light by raindrops. The colors of the spectrum are separated in this manner because they represent light of different wave lengths which increase as the spectrum is traversed from the violet to the red.

Besides the spectrum of light which



Distribution of the Principal Colors in the Visible Spectrum

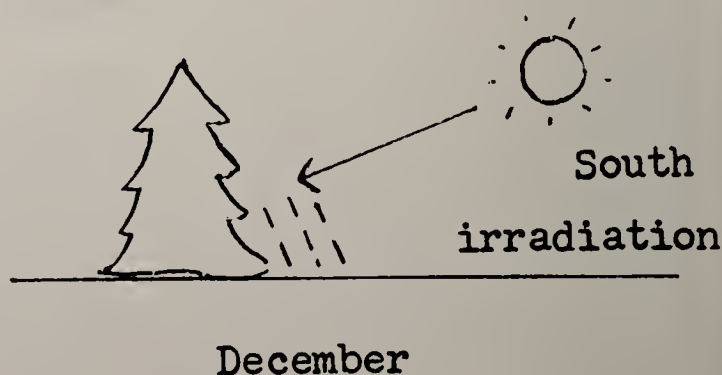
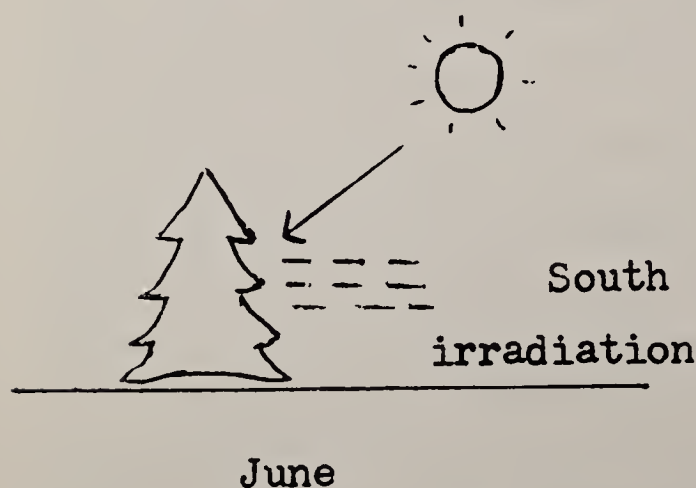
we can see, there also exists invisible radiation. At the far end of the spectrum, at wave lengths longer than red, there exists invisible radiation called the "infrared." Infrared means "below the red." These wave lengths extend out indefinitely beyond the end of the visible region. As the wave length increases, the radiation emerges into *heat waves* and finally into radio waves. The wave lengths of light constitute its "quality."

The effect of latitude, time of day, time of year, and tilt of the earth's surface on the angle of incidence (the angle of the earth in relation to the sun) affect the intensity and duration of light. During the summer months, when the angle of incidence is greatest, we experience long days; in the winter, when the angle is fairly small, we have short days.

Now, what happens when light strikes the south side of a vertical surface, such as a spruce or other evergreen, during mid-winter? The chlorophyll in live green foliage and grass absorbs a large percentage of visible

radiation which falls upon it but absorbs little of the invisible infrared radiation. Thus during December, the infrared that strikes a south-facing surface such as a spruce or other evergreen will be irradiated. Since there is a small angle of incidence, these irradiated heat waves are projected downward to the grass in front of the tree.

A vertical surface at 42.4° N. Lat. (Denver is 39.75° N. Lat.) will irradiate an amount of energy equal to 3,120 BTU per sq. ft. per day. (One BTU is the quantity of heat which must be supplied to one pound of water to raise its temperature one fahrenheit degree.) The amount of heat reaching the grass will be even greater than this figure as we must consider also the amount of infrared striking the lawn directly from the sun light. It could probably run as high as 4,500-5,000 BTU per sq. ft. per day. In contrast, during June when the angle of incidence is greatest, only 715 BTU per sq. ft. per day will be reflected from such a vertical surface.





**NORMAL
PANCHROMATIC
FILM**

The irradiation of the infrared heat waves thus result in increased leaf temperature of the grass in front of it, therefore increased transpiration. Also the ground moisture in this area is lost by evaporation. Because of Denver's relatively dry winter, these factors can cause plant desiccation and eventually death. This, then, is why a lawn area

will die out in front of an evergreen or other vertical surface.

The prevention of the dead area of lawn can be accomplished by periodic waterings during the winter. Also remember to water your evergreens at this time since you already have the hose out. This is a practice which has been neglected by many of us.

**INFRARED
FILM**



Infrared is reflected almost entirely by the leaf and blade structure, and therefore is recorded by means of infrared sensitive film. Foliage and grass thus appear white in an infrared photograph.

PIÑON TREES *vs.* SCHOOL FUND

WES WOODWARD
State Land Commissioner

SOME TWENTY MILES north of Fort Collins on the Laramie highway stands an ancient grove of piñon trees. The trees, unnoticed by thousands of autoists on the highway, look very much like the millions of piñons in southern Colorado. But there is a difference.

A garden club resolution of 1951 indicates that the grove contains the largest and oldest known specimens of piñon pine, some of its oldest trees being estimated to be 700 to 800 years old, and is the farthest north stand in North America.* Perhaps the grove is most accurately described by Dean C. H. Wasser of the College of Forestry at Colorado State University. Dean Wasser says, "The grove is isolated from the main body of piñons, represents the northeasternmost distribution of known stands in the United States, and contains some very old specimens."

Certainly this is an interesting grove of trees and it seems they should be preserved.

There would be no question about preserving the piñon grove if it weren't for the fact that this grove is growing out of a limestone deposit. And the limestone here is near the surface and exceptionally pure. It is the nearly-pure limestone used in the manufacture of sugar.

Now: The piñon trees and the limestone deposit are located upon a State

school section; one of the sections of land granted to the State of Colorado by the "Enabling Act" which provided for the admission of Colorado to the Union. The act was passed by the Congress of the United States in 1875. It reads, in part: "The sections numbered sixteen and thirty-six in every township — are hereby granted to said state for the support of common schools."

The constitution of the State of Colorado states, in Section 10: "It shall be the duty of the state board of land commissioners to provide for the location, protection, sale or other disposition of all the lands . . . granted to the state . . ., under such regulations as may be prescribed by law; and in such manner as will secure the maximum possible amount therefor. No law shall ever be passed by the general assembly granting any privileges . . . by which the amount to be derived by the sale, or other disposition of such lands, shall be diminished, directly or indirectly."

In the 86 years since Colorado became a state there has been no other interpretation, by the land board and those familiar with the law, than this directive to preserve the land for the benefit of the schools and to obtain the maximum amount therefrom for the school fund.

In the light of the laws it has seemed clear to the Board of Land Commis-

*Dr. C. L. Porter, University of Wyoming, reports a small stand of piñon pine east of Green River in southern Wyoming. (Editor)



Piñon Grove Patriarch

sioners that they cannot turn this land into a park or reservation for the benefit of the public or any groups of individuals.

In accordance with the laws, the Land Board, in 1924, granted a limestone quarrying lease on this section of land. The quarry has now been in operation for 37 years. The limestone, being near the surface, is removed by strip mining methods, which means that the trees are destroyed as the quarrying progresses. Originally, there were about 250 acres covered by the trees. Up until today about 97 acres of the grove have been destroyed. This means that about 153 acres of the trees are still undisturbed. The Sugar Company operating the quarry has indicated that a large portion of the remaining trees will never be disturbed.

The State's contract with the Sugar Company under which the limestone is

quarried is a perfectly legal and binding contract and cannot be terminated as long as the terms are faithfully fulfilled.

Under this contract the quarry has produced some 900,000 tons of limestone for which the school fund has been paid \$119,830 in royalties, plus a rental fee of \$320 per year. It is estimated by the mining contractor that roughly one-fourth of the strippable limestone has been recovered from this section. This leaves some 3,000,000 tons to be removed. At the present rate of 30c per ton, the school fund can reasonably expect an additional \$1,000,000 income from this property.

These recovery estimates do not take into account potential income from limestone that may be removed by underground mining methods which may be used in the future. The section

Dense
Piñon
Stand
on
School
Section



is also leased for grazing purposes, producing additional revenue for the school fund.

It appears that it is the duty of the Land Board to see that the quarrying operation continues. However, the Board is greatly concerned with the attitude of the public and the conservationists. Frequent inspection of the area has been made by the Board and experts have been invited to see and study the area. During the summer of

1961 Dean Wasser of the College of Forestry inspected the grove and quarry and prepared recommendations to the Board. These recommendations were passed on to the quarry operators with the request that the trees should be preserved where possible and that adequate precautions should be taken to prevent erosion.

It is hoped that this article will help in establishing a better understanding of the true situation at the piñon grove.

Photographs by George O'Malley, State Parks and Recreation Dept.

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Let's Make A Wreath

KATHARINE B. CRISP

RATHER than deck the hall with holly that comes from a distant place, make a wreath of plant materials that can be gathered near your home. In our gardens, in the nearby fields, in our mountains, much material can be gathered without damage to the surroundings.

In the December 1956 issue of *The Green Thumb*, Rebecca Enos and Persis Owen gave excellent suggestions for making a wreath with cones, pods and other dried material. Since you may have lost your copy of the magazine, we quote from the article:

“Buy a florist’s wire frame which is several inches thick and is made with two pieces of wire instead of just a single flat one. Cover the space between the two circles with chicken wire fastened securely. This wire is put on in order to hold wet sphagnum moss which has been squeezed out of water and forced into the frame. As the moss dries it hardens and will hold any material you want to stick into it.

“Now, beg, borrow, or steal several different sizes of pine cones. Put a few nice fat ones on the top of your wreath, and dwindle the size toward the bottom. A nice effect at the top is to add curled pods from the locust tree — perhaps your neighbor won’t miss them! Make these look like a big bow-knot tied up there. Hair pins can be used to secure them on to the moss. A couple of pomagranates at the base of the pods will add a nice touch of color.

“Stick the little cones into vacant spaces around the circle. This is done more easily when the wreath is flat so that you can pour glue on the spot where the cone is to go. Gluing is for small, light ones only. Reverse some of them in places, putting the broad, flat end facing out. It will look like a brown rosette.

“A long needle and brown crochet cotton will help in tying the larger cones in place. Work the heavy thread between and around the scales leaving one end of the thread loose at the back to tie with the other end that is wrapped around the object. Everything on the wreath *must* be firmly fastened.

“So now that you know the method you can start collecting materials ‘for free.’ Use your imagination and make something different. A wreath like this will keep for other years with only a bit of changing each time.”

Where shall we collect? In your garden or in your neighbor’s garden can be found several types of pods — iris, lily, poppy, honey locust, just to name a few. In our mountains our native pines, spruces and Douglas firs scatter cones of many sizes and shapes that can be picked up on the ground. In the Denver area are such introduced trees as the larch that sheds smaller cones less than an



Cones of: ponderosa, piñon, limber, bristlecone, eastern white and Swiss mountain pine; Douglas fir; Colorado and Engelmann spruce.

Bur oak acorns; poppy and tulip pods; sycamore balls.

Wreath by Mrs. Katharine B. Crisp

inch long, the eastern white pine with the long graceful cones, and the Swiss mountain pine with almost spherical cones.

It is possible too, to gather acorns of bur oak, red oak, and white oak if you can intercept the squirrels before they damage the fruits. Edible nuts sold in the market can also be incorporated into the wreath. These must

be wired by drilling a hole through the nut. Non-perishable fruits may be used to give a touch of color.

Each article used in the wreath may be given a rigid wire stem, which can be inserted in the base that forms the ring of the wreath. A florist's frame twelve to fourteen inches in diameter is a convenient size. Instead of sphagnum moss, crumbled brown paper from

paper bags makes a good filler. Wrapping the ring with plastic ribbon makes a neat base.

The cones and seed pods should be sprayed with liquid varnish for a lasting finish. The wreath can be used for outdoor or indoor decoration.

As the years go by the wreath can be modified with a few simple additions or changes. Gilding a few of the cones adds new interest to the wreath. Gold ribbon used in a bow or evergreen boughs can modify the background.

Snow effects may be obtained by using the lather of soap or white shoe polish can be daubed on a few cones.

A push-button spray container of snow is a decorating aid.

Glitter, a granulated material, usually silver or gold in color can be used in the wreath to give sparkle to the edges or to decorate nuts, fruits, and berries. To apply, sprinkle it on an adhesive coating, such as rubber cement or clear nail polish.

It takes many cones and pods to make a wreath so begin gathering material as soon as you can. You are a busy person and you may not finish your wreath this year. It took me two years to complete mine. But there were many odd moments of fun hunting and collecting with the squirrels.

Cones of:
ponderosa,
Swiss mountain,
limber,
bristlecone,
eastern white,
piñon pine,
Douglas fir,
Colorado and
Engelmann
spruce.
Bur oak acorns,
poppy pods,
tulip pods,
yucca pods,
peach stones,
sycamore balls,
gourds

Wreath by
Mrs. J. P. Steele, Jr.



DWARF FRUIT TREES CAN TAKE DENVER WINTERS

GUY FOX

THIS IS THE first report on our study of dwarf fruit trees in the Denver area which was proposed in the March 1962 issue of *The Green Thumb*. We have received data from 13 different growers on 44 dwarf apple trees, 4 dwarf cherries, 3 dwarf peaches, 1 pear, and 1 nectarine. Eleven of the growers live in metropolitan Denver, one just south of Longmont, and one in Pueblo.

APPLE VARIETIES	
Red Delicious	12
Lodi	8
Golden Delicious	7
McIntosh	3
Red Melba	3
Jonathan	2
Delcon	2
Wealthy	2
Early Red Bird	1
Duchess of Oldenburg.....	1
Jon-Grimes	1
Jon-A-Red	1
Stark's Earliest	1
<hr/>	
Total	44

Of the above, only one tree, a Lodi variety, was a casualty to the severe winter just past. This tree was growing on a terrace on a dry hillside. We wonder to what extent dryness was a factor in this winterkill. Dwarf Lodi apple trees in other situations of even more severe cold came through the winter successfully.

One grower, living just south of Longmont in the Boulder Creek Valley, reported temperatures of 39 degrees below zero one morning and in the low 30's below zero on two other mornings, yet his seven dwarf apple trees came through the winter in good shape.

Here we should note an incomplete report, not included above, from a

grower in Roggen, Colorado. This grower apparently lost two dwarf pear trees, one dwarf peach, and one or two apple trees to "winterkill." Details are lacking.

There have been two casualties to fire blight; both of them were Jonathan apples. Apples differ in their resistance to this bacterial disease. Red Delicious is highly resistant; Jonathan is quite susceptible.

Three of the apple trees were planted this spring, 1962. Twenty-six apple trees were planted in 1961, 3 in 1960, 8 from 1957 to 1959, and 4 before 1957.

One apple tree, a Golden Delicious, planted in 1957, bore fruit in 1958, 1959, 1960, and 1961. It has no fruit this year. Eleven other apple trees came into bearing as follows:

Second year after planting.....	1
Third year after planting.....	5
Fourth year after planting.....	3
More than four years after planting..	2

Three of the trees slowest in bearing suffered handicaps in getting started, such as a second transplanting. Of the bearing trees, last year two produced about 1½ bushels each, two about ¾ bushels each, three about ½ bushels each, and two trees less than this. Six of the older trees were reported as "loaded" or with "a good crop" this year.

Here we should note two apparent exceptions. One grower reports buying a dwarf Delicious apple tree in 1954 "and to this date it has never had an apple on it; hasn't even bloomed." Another grower reported by phone that a dwarf apple tree purchased several

years ago has grown all right but fails completely to bloom. We know of no explanation for this.

Most of these trees are still too young to determine ultimate size. The older trees from two nurseries range in height from 7 to 10 feet while three trees from a third nursery are reported at 11, 12, and 14 feet in height.

FRUITS OTHER THAN APPLES

The four dwarf cherries were all different — a North Star, a Dwarf Rich, a Montmorency, and English Morello. The North Star, planted in 1953, is now about 7 to 8 feet high and has been bearing good crops regularly since 1955. The Dwarf Rich was planted in 1957 and began bearing in 1961. The other two, planted in 1958, began bearing in 1961 and "have done well."

Two of the three peaches were planted this past spring, 1962. The other peach and the nectarine were planted in 1958 and three years later bore fruit "of excellent quality." However, the peach was a casualty this past winter. The nectarine suffered some but survived. However, there is no fruit this year. The pear tree, a choice variety of French origin which was planted in 1950, has borne good crops for the past several years. A recent report, however, indicates that it is having a serious battle with fire blight.

NURSERIES SUPPLYING DWARF FRUIT TREES

The above dwarf fruit trees were purchased from four different nurseries — Stark Bros. of Louisiana, Missouri; Inter-State Nurseries of Hamburg, Iowa; Henry Field of Shenandoah, Iowa; and Henry Leuthard of Port Chester, New York. In regard to the type of rootstock used in the dwarfing process, these nurseries report as follows:

Stark Bros. state, "We grow our

dwarf apple trees first on seedling roots and on to the seedling (graft or bud) a hardy interstock and then on that the special wood that makes the tree a dwarf, and then on to that the variety of apple desired. When you plant our dwarf apple trees, you plant them deep enough that some of the hardy wood is in the ground."

Inter-State Nurseries report, "On dwarf apple trees, we use an interstock method which is simply using a hardy crab seedling rootstock then top working or budding the dwarf stock onto the seedling root and then budding or grafting the named variety of apple tree onto the interstock or piece of dwarfing stock."

The Henry Field Nursery states, "We use only Clark Dwarf and Malling IX stock in dwarfing apples. We do this in three ways:

1. "We make a double graft. Take apple seedling, graft 4-inch piece of dwarfing stock on this, and graft on variety, all at same time.

2. "Plant seedling and bud it with dwarfing stock. The next year we then bud on variety we want, 4 or 5 inches above first budding.

3. "We graft dwarfing stock on seedling and bud this later."

Henry Leuthard uses Malling rootstock without an interstock.

TENTATIVE CONCLUSIONS

Several tentative conclusions seem justified from this first summary of data in our study of dwarf fruit trees in the Denver area:

1. The interest in dwarf fruit trees seems to be growing.

2. The dwarf apple trees seem quite able to take our Denver winters, since the recent winter was unusually severe. Data are not sufficient to warrant conclusions regarding other fruits.



Mrs. Guy Fox
with
Dwarf Golden
Delicious
Apple Tree

3. The dwarfs do begin bearing early, usually by the third year.

4. Western nurseries seem to be using the interstock method in producing dwarf apple trees. They claim that this method produces a hardier tree and a stronger trunk with less likelihood of the top getting roots into the soil, resulting in loss of the dwarfing control.

Denver Botanic Gardens wishes to thank the many gardeners who have

shown an interest in this study and have taken time to report on their experiences with dwarf fruit trees. We will welcome reports from others east of the mountains in Colorado who are growing dwarf fruit trees. By pooling our experiences over a period of several years, we should be able to determine the value of dwarf fruit trees in this area, the advantages and disadvantages of dwarf fruit trees, and the varieties that perform best and those least successful.

SOUTH DENVER EVERGREEN NURSERY

1534 South Broadway

Established 1920

SPruce 7-2350

Imported Holland Bulbs



Evergreen Christmas Decorations

Fire Place Wood — Piñon Pine and Apple

FREE ESTIMATES ON NEW LAWNS, ROCK GARDENS AND LANDSCAPING

MR. THOMPSON RESIGNS

A. C. HILDRETH

MR. HERLEY C. THOMPSON resigned his position of Botanist-Horticulturist in the Denver Botanic Gardens, effective the 24th of August. He has accepted an appointment as Instructor in Floriculture in the Floriculture Section of the Department of Soil and Crop Sciences, Texas A. and M. College at College Station, Texas.

The duties of his new position involve both teaching and research. Of particular importance to him is the opportunity which his connection with the College affords for continuation of his graduate study, leading to a doctor's degree in plant pathology.

Mr. Thompson joined our staff last year near the end of December. Previously he had been employed by the Illinois Natural History Survey, where he worked on midwestern tree diseases. Although his stay with us was brief, he left an enviable record of accomplishment.

Most of his time was devoted to editing *The Green Thumb* magazine. Under his direction this publication was improved both in appearance and in editorial quality. By rigid enforcement of the deadline for receiving material he was able to get the issues of the magazine out on time — something that was not being accomplished prior to his taking over the editorship. He also wrote a good style manual which will insure uniformity in editing *The Green Thumb* and other publications of our institution.

In addition he took an active part in our Children's Garden program. He was particularly successful in dealing



with the children and was effective in instructing them in the planting and care of their plots. He also gave educational lectures on horticultural subjects to various groups, conducted interesting and instructive tours through the plantings and participated in our public information program, answering questions and offering advice on gardening problems.

Mr. Thompson's resignation leaves a great gap in our organization, which we hope can be filled by someone equally capable and devoted. The Board of Trustees and members of the Denver Botanic Gardens join in expressing their sincere thanks to Mr. Thompson for his faithful and efficient service and wish him success in his new position.

PETE

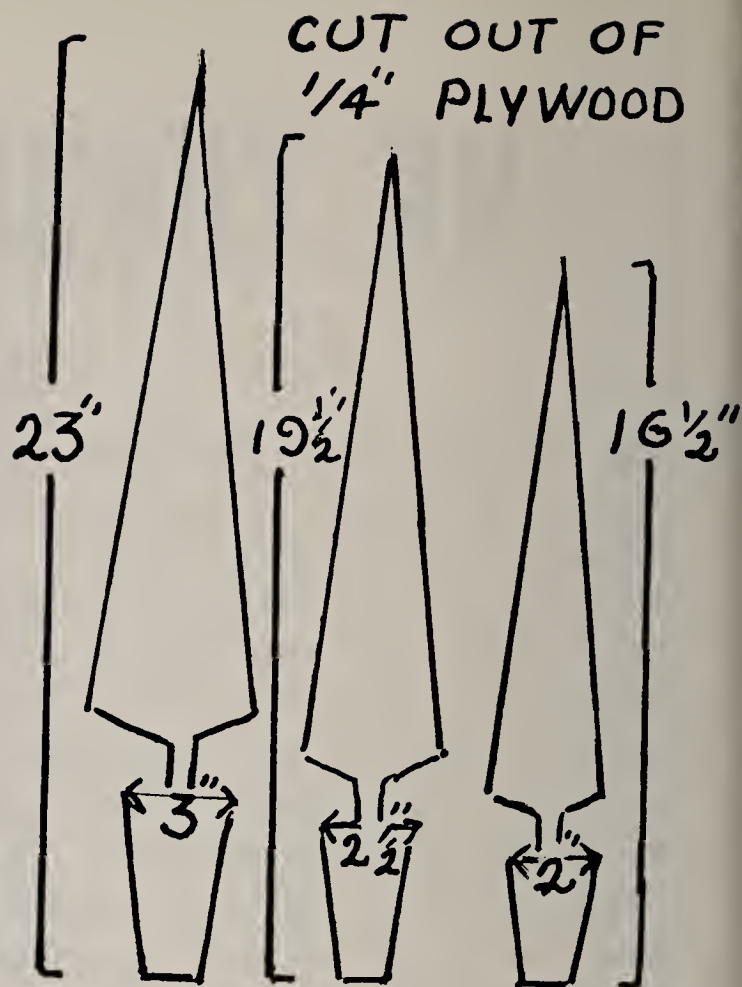
Ponders

Dear Pete,

Early last December the Floral Art Club presented a wonderful display of Christmas ideas at Botanic Gardens House. Each exhibit was an inspiration. Can you give me the recipe for the flat, stylized trees made with acorn cups?

OBE JOYFUL

P.S. Is the club planning a similar show this year, I hope?



Dear Obe,

Although your questions have given us a speaking acquaintance with half the membership of Floral Art Club we have been unable to find the exhibitor of the trees you mention. Perhaps we merged two ideas, or the exhibitor will step forth.

One lead led us to Esther Holtz who displayed three, flat stylized trees incorporating five species of cones, three or four rows of a species, ranging from lodgepole cones at the base, tips of Douglas fir, tips of blue spruce, the stem end of piñon, hemlock (larch is more readily available here) and alder at the top. Mrs. Holtz used handmade containers, but she also recommends using frozen juice cans covered with glue, rolled in sand, and then sprayed with gilt. Stabilize the tree trunk by filling the container with plaster of Paris. Fasten the cones with regular household cement and spray the entire tree. Various cones absorb gilt differently to provide variation in texture.

To cone-happy craftsmen "Here's the pitch" indicates something to get off the cone without getting it on your

hands. Mrs. Holtz suggests baking heavily resinous cones in a 250-degree oven for one hour. Use aluminum foil to catch the resin.

Our inquiries also led to Mrs. M. Edgar West who as president requested the creditable display. Her offering was a cylindrical tree made from 600 plus acorn cups gathered from oaks native to Oklahoma. (Our scrub oak cups are slightly smaller.) Mrs. West used an 18-inch styrofoam cone attached to a discarded lamp base. To the center of each gilded acorn cup she glued a tiny gold ball found on strings of Christmas balls. Cups, graduated in size with the smallest at the top, were attached to the cone with styrofoam glue.

I, too, am thumping for a repeat performance without the work and elegance of the lovely tea. At press time Floral Art Club, under the presidency of Mrs. L. J. Woodman, is enjoying its annual recess.

Dear Pete,

I've been blessed with a gift bougainvillea. What do I do now?

VINNY THE MOOCHER

Dear Vinny,

From one moocher to another, "Ask the man who owns one."

Garneth Campbell is our modest authority. Her bougainvillea blooming in a south window on south Elati attracts more attention than a flashing neon sign. She has found the plant has an insatiable desire for sun. Even the intense heat of a plate glass window will not wilt its blossoms.

Mrs. Campbell uses rich potting soil, similar to African violet soil. She gives her plants an occasional feeding of superphosphate and waters them generously. She cautions that bougainvillea is a leaf-losing plant and frequently

blooms without any foliage. If the plant becomes spindly, trim it vigorously to encourage branching. She even reports cutting the roots vigorously when repotting older plants. Although her plants summer on a west patio she feels they prefer more sunshine and less wind.



CYCLAMEN DISEASES

J. L. FORSBERG, *Plant Pathologist*

Illinois Natural History Survey, Urbana, Illinois

Reprinted from the Illinois State Florists' Association Bulletin, No. 191, March 1959.

BECAUSE OF the substantial investment in time and labor required to produce a finished crop of cyclamen plants, disease control is extremely important if a profit is to be realized. Although the number of diseases affecting this crop is comparatively small, some of them are quite devastating.

SOFT ROT

Symptoms. — Soft rot, caused by the bacterium *Erwinia carotovora*, is probably the most common and the most destructive disease affecting cyclamen. Often the first visible symptom is a sudden wilting and collapse of the plant (Fig. 1a). In such plants portions of the corms usually have broken down into a soft slimy mass although the roots may remain intact (Fig. 1b). In some instances individual leaf petioles and flower stems become affected

with a soft slimy rot and soon wilt and droop. Such plants may become stunted and unsightly from loss of leaves. The rot progresses most rapidly during the high temperatures of the summer months.

Control. — Extreme care should be used when watering because the causal bacteria may be spread from plant to plant by splashing water. Affected plants should be removed and destroyed as soon as they are detected. The plants should be given adequate space so there will be good air circulation around them. All soils, flats and pots should be sterilized before being used to grow cyclamen.

STUNT

Symptoms. — Plants affected with stunt, caused by the fungus *Ramularia cyclaminicola*, are conspicuously stunted but not quickly killed. Leaves are small and may be yellow. The petioles and flower stalks are shorter than normal and the flowers characteristically open below the leaves (Fig. 2). Reddish-brown necrotic areas occur in the tissues of the corm (Fig. 3). These areas are particularly evident at the crown but also extend for short distances into petioles, peduncles, and large roots.



Fig. 1a. Wilted cyclamen plant affected with soft rot. (Photograph courtesy of Illinois Natural History Survey)



Fig. 1b. Sectioned corm of plant affected with soft rot. (Photograph courtesy of Illinois Natural History Survey)

A leaf disease and a wilt sometimes are produced by the same fungus that causes stunt. Brown irregular areas of varying sizes and with indefinite diffuse margins are produced on the leaves.



Fig. 2. Plant affected with cyclamen stunt. Flowers open below the leaves on diseased plants. (Photograph courtesy of Illinois Natural History Survey)

Severe wilting and yellowing of the basal leaves may occur. Many or all of the flowers and upper leaves may be wilted also.

Control. — Seed from healthy plants should be planted in sterilized soil. Seedlings should not be grown near old infected plants. Spraying young plants with a fungicide such as ferbam may be helpful, especially if the leaf disease phase is prevalent.

LEAF SPOTS

Symptoms. — Dead spots on the leaves (Fig. 4) may be caused by the fungi *Glomerella cingulata*, *Phyllosticta* sp. and *Ramularia cyclaminicola*. In severe cases partial defoliation may result (Fig. 4).

Control. — Remove and destroy all infected leaves. Humidity should not be kept higher than necessary to produce good plant growth. Spray the young plants with ferbam at two- to three-week intervals. Potted plants can be turned upside down and dipped in the solution instead of spraying.

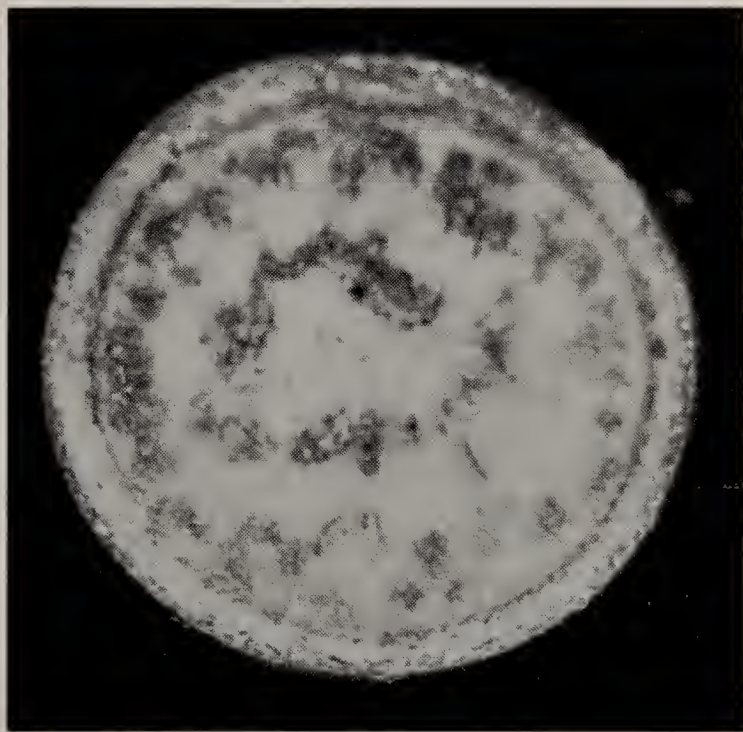


Fig. 3. Cross-section of cyclamen corm affected with the stunt disease. (Photograph courtesy of Illinois Natural History Survey)

BOTRYTIS BLIGHT OR GRAY-MOLD DISEASE

Symptoms. — Under conditions of continued high humidity, the fungus *Botrytis cinerea* causes a soft decay of flowers and leaves. The affected parts soon become covered with a downy gray mold. Later these parts dry to gray-brown.

Control. — The disease is quickly checked if the relative humidity is reduced below 85 per cent. The humidity may be controlled by heating and ventilating to reduce moisture, instead of just to control temperature. Give plants adequate spacing to improve aeration and reduce humidity. Spraying with ferbam or captan may be of some benefit.

PETAL SPOT

Symptoms. — *Botrytis cinerea* also causes a petal spot disease. It is not known if this disease is due to a strain of the fungus different from the one which causes the gray-mold disease or if the difference in the two diseases is due to different environmental conditions. The petal spots are small, round to oval, few to many, scattered at random between the veins of the petal.



Fig. 4b. Cyclamen plant being defoliated by a severe attack of the leaf spot disease. (Photograph courtesy of Illinois Natural History Survey)

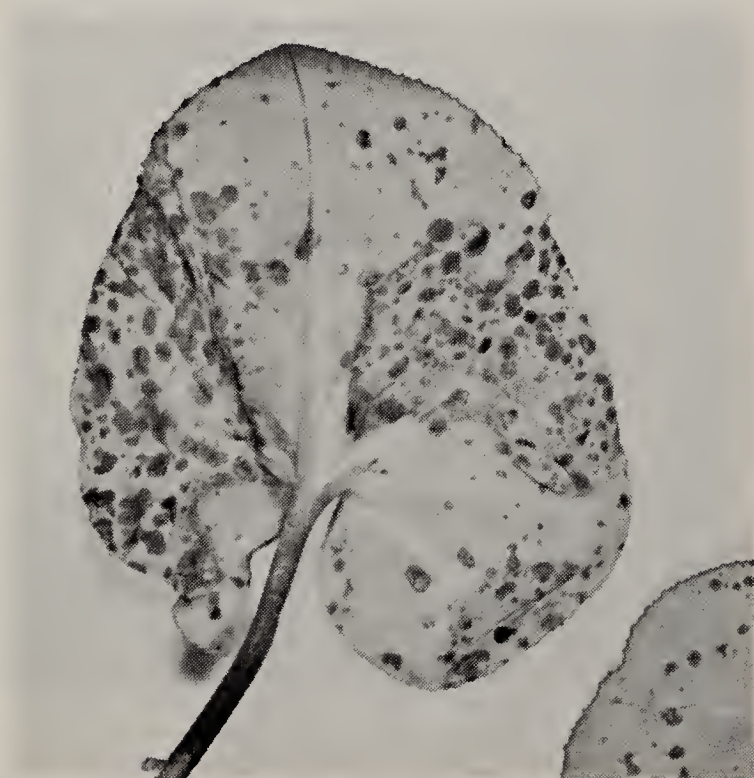


Fig. 4a. Cyclamen leaf infected with the leaf spot disease. (Photograph courtesy of Illinois Natural History Survey)

On pink, red, and salmon-colored varieties, the spots consist of an outer band of living tissue whose color is deeper than the normal color of the petal and a very small center which at first is of normal color, soon becomes water-soaked, and finally tan and necrotic. On white-flowering varieties, the outer band of the spot first appears water-soaked while the center is necrotic; later the entire spot becomes necrotic. When heavily spotted, petals may be distorted.

Leaf infection may occur occasionally in conjunction with petal spot, but it is generally confined to older leaves and is of minor importance.

Control. — This disease can be controlled by proper manipulation of heat and ventilation to reduce the relative humidity, especially during the evening hours. All flowers with spotted petals should be removed promptly and destroyed.

Dormant Senses

DONALD PAYNE

IN THE PLANNING of home grounds the only consideration seems to be that which is seen. The visual aspect of any outdoor area is of prime importance, but should we forget our senses of smell, touch, and sound? The very thing that lures us out of the car on a mountain trip is an urge to experience the naturalistic more closely. Much of the delight of being in the out-of-doors comes from the sensations received through senses other than sight. Recall how you enjoyed trodding through last year's fallen aspen leaves down to the edge of a stream and resting on a large boulder to soak in the surroundings. The gurgling of the water, the rustling of the trees, and the smell of wet foliage along the bank all contributed to the sensation of being in a pleasing environment.

Of course, it's impossible to have a babbling brook or a grove of scented ponderosa pines on our 75-foot lots, but maybe there are small subtleties we can introduce into our outdoor living areas to appeal to the senses of smell, touch, and sound.

Our immediate thought in producing a garden oriented toward the nose is the succession of sweet-scented flowers throughout the year. We have a variety of plants, from early blooming bulbs in the spring to a wealth of perennials, shrubs, and trees during the summer. But rather than depend on the brief bloom of passing flowers,

wouldn't it be more advantageous to introduce into our gardens a more permanent source of fragrance? Almost any garden encyclopedia will list scores of plants with aromatic foliage which can be enjoyed the entire growing season. Most of these plants are members of the mint family, for example sweet basil, artemesia, sweet marjoram, lavender, rosemary, and, of course, the mints themselves with an almost endless list of name prefixes such as pepper, spear, apple, brandy, mountain, marsh, garden, field, brook, cat, dog, fish, horse, mackerel, lamb, whorled, wild, and wooly. These and other fragrant foliated plants may be planted under windows, near outdoor living areas, or on patios in containers. Consider unconventional uses of these aromatic plants, such as planting thyme or mint between the flagstones of a garden path so that their aromatic leaves will be crushed underfoot.

At first glance we say that our sense of touch can not be satisfied because there's nothing we handle in the garden. Consider that we constantly have a material underfoot. We're accustomed to walking on the hard concrete surface of a patio, but as we travel a path or surface not so closely related to the building, maybe it would be enjoyable to trod a softer, more informal material such as loose gravel that gives slightly underfoot. Among the different types of stone particles there's a range of characteristics and degrees of softness from very soft and quiet sand to larger particles of coarse gravel and colored crushed stone that crunch when stepped upon. An entirely different sensation could be had if some spongy material like shredded bark were used. Consider the appeal of variety underfoot, walking from a resilient pine-needle path, to hard flagstone, to velvety grass.

Ordinarily a branch or bough protruding into a trafficway would be pruned off. Maybe this partial obstruction should be left to be brushed against when passing. The touch of a limb of waxy leaves or the needlelike feel of a pine is reminiscent of what we enjoy on an outing in the mountains.

In trying to provide pleasant sounds in our backyard development, we shouldn't rely too heavily upon wildlife. By planting a few bird-attracting shrubs we can hardly expect to attract a flock of song birds, and our 10-foot shade trees aren't much of an attraction for chattering squirrels. However, with ingenuity and minor expense we may have the essence of some of the sounds of nature.

An amazingly small trickle of water can be as pleasant a sound and be as psychologically cooling as a mountain waterfall. A half-inch pipe fed with an inexpensive recirculating pump can create all the intended charm and intrigue. Whether a naturalistic setting with boulders and rock ledges or a purely artificial arrangement such as a simple bowl with a miniature central jet, arrange it so the water drops cleanly into the lower surface. Any water that clings to the under surface of a fall or the sides of a discharge pipe simply drops unobtrusively, contributing nothing to the splashing, spattering fascination of free-falling water.

A Japanese garden in Kyoto contains a prime example of employing a minimum amount of water for maximum sound appeal. A trickle of water drops from a pipe into the open end of a short length of bamboo mounted on a pivot in seesaw fashion. When the bamboo reaches its capacity the balance is altered. The bamboo tips, spilling its contents over a series of flat stones. With the release of the load the counter weighted bamboo returns to its former position forcing its opposite end to thump down against the surface below. In addition to the attraction of moving water, it produces a perpetual rhythm of trickling water, followed by rushing water, climaxed by a drum beat of hollow bamboo on stone.

Wind can also participate in the orchestration of outdoor sounds. Consider certain twiggy plants like the hawthorn or a partially open fence to produce soft whistling sounds, or plants with persistent leaves such as the Russian Olive to rattle and rustle in the wind. The slightest movement of air will make hanging bamboo chimes clatter or glass chimes tinkle. These sounds, as well as being soothing to the ear, serve to psychologically accentuate the effect of a cooling breeze.

Such things as these cultivate our fallow sense of smell, touch, and sound and make outdoor-living areas more than just pretty pictures.

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THE ALPINE GARDEN

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E. H. BRUNQUIST

WHAT IS THE *status quo* of the Alpine unit of the Denver Botanic Gardens on Mount Goliath?

The hard work and dedication of many individuals, especially Dr. John R. Durrance, Dr. Moras Shubert, Mr. M. Walter Pesman and former Director, Robert Woerner, and the excellent cooperation of the U. S. Forest Service, have given this enterprise a good start. Plenty of its potential, however, remains for future realization.

Further development depends not only upon the research policies of the Board of Trustees, but also upon the continuing contributions of volunteer workers as well as upon the cooperation of the general membership of the organization. The latest contribution was the labeling of individual plants along the trails this summer, for which George Kelly is responsible.

Interested readers of *The Green Thumb* can profit from the following briefing:

(1). The Alpine Garden unit on Mt. Goliath was established jointly by the U. S. Forest Service and the Denver Botanic Gardens.

(2). Access is by way of Colorado Highway #5, which is the black-top road from Echo Lake to Summit Lake, and on to Mt. Evans. Echo Lake may be reached by way of Colorado Highway #103, either from Bergen Park (and over Squaw Pass) or from Idaho Springs.

(3). The main trail through the area is about 2 miles in length and its upper end, above timberline, has a roadside parking area which is almost exactly five auto miles from Echo Lake junction. The lower end of the trail, a little below timberline, also has a road-

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side parking area which is about three miles from Echo Lake junction.

(4). Plant specimens of all but the very rare species gradually are being collected for the Kathryn Kalmbach Herbarium of the Denver Botanic Gardens where they will be available for observation and study.

(5). Several lists of flowering plants and ferns of the area have been

prepared by the author. The 1962 revision was expanded to include brief descriptions of most of the plants, and was issued in particular for members of the Colorado Federation of Garden Clubs. Copies of this descriptive list are available at cost (40¢) at Botanic Gardens House.

The list is organized in such a way that family relationships are emphasized and relationships to common cultivated plants are indicated.

Thus far representatives of 29 plant families have been discovered in the area and more than 95 species have been definitely recognized. We want people who know wild plants to have a copy of the list and to help us make it more nearly complete. Mosses, liverworts, fungi, algae, lichens, bacteria (!) and such are not included.

Final mounting and labeling of the Mount Goliath specimens will require volunteer workers and this activity is under the supervision of Dr. Helen Marsh Zeiner, head of the Herbarium Committee.

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Our Heritage

M. WALTER PESMAN

HISTORY IS NOT DULL if it concerns things in which we are personally interested. The following was dug up as a part of the Grant-in-Aid Project on cataloguing the books of the Western History Department of the Denver Public Library, headed by Mrs. Mary Wegg, assisted by Mrs. Louisa Ward Arps.

The latter we remember as the gracious nature-lover who was kind enough to take our readers "Botanizing with Edwin James" in the July 1961 issue of *The Green Thumb*. She is also the author of "Denver in Slices." Here are the results of the horticultural research:

"The Colorado State Horticultural Society was organized on September 30, 1880. It was constituted a state bureau of horticulture by the Legislature on March 8, 1883.

"The name of the Society was changed to Colorado State Horticultural and Forestry Association on January 13, 1888.

"In 1891 the Association changed its name to Colorado State Bureau of Horticulture.

"In 1893 the act of 1883 creating a state bureau of horticulture was repealed and a State Board of Horticulture was created. Its report continues the volume numbering of the report of the Colorado State Bureau of Horticulture.

"The Colorado State Board of Horticulture was abolished in 1913 when the Legislature created the office of Colorado State Horticulturist. Monographic publications of this organization and unclassified serials are entered under the name which the organization bore at the time these publications were issued.

"Classified serial publications are entered under the latest name under which the publications were issued."

All this is ancient history by this time. More recent was the organization of The Denver Society for Ornamental Horticulture in January, 1916. It was the active horticultural body for about ten years, then went into a decline. By that time a number of garden clubs had sprouted up, many of them merging into the Colorado Federation of Garden Clubs. Even the menfolks started the men's garden clubs.

If you get the impression from all this that there is "nothing lasting here below," let me point out that one organization carried on from 1884 to 1944, namely the Colorado State Forestry Association. It was changed to the Colorado Forestry and Horticulture Association in 1944. After sixteen years of very active life it, in turn, merged with the Denver Botanic Gardens (January, 1961). *The Green Thumb* magazine carries on as before.

So here we are, carrying the banner (or torch, if you prefer) for Colorado horticulture.

We have an enviable heritage of which we should be proud. We also have a responsibility for the future. This responsibility is keenly felt by the Denver Botanic Gardens' Board of Trustees and by its membership. That means *you*, reader!

T · H · E NAME M. WALTER PESMAN G · A · M · E

Symphoricarpos is the generic name for snowberry and Indian currant.

sym, from *syn*, means with or together, as in sympathy (feeling together) and symphony (sounding together).

phori, from *phoros*, means bearing or carrying, as in phosphorus (light carrier).

carpos, from *karpas*, means fruit, as in *Physocarpus* (nine-bark) and *Cercocarpus* (mountain mahogany).

So, bearing fruit together (in clusters) is typical for *Symphoricarpos*.

P.S. Manzanita will be the subject for the next issue.

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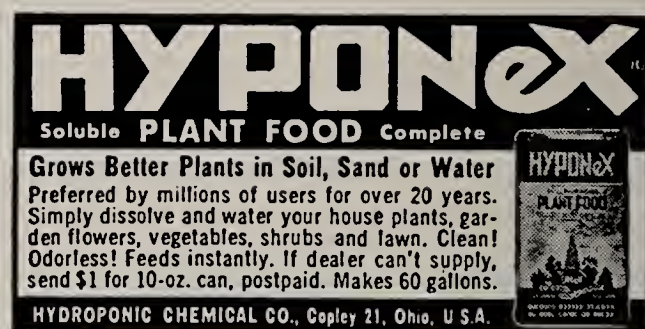
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G I F T

Memberships

A membership in the Denver Botanic Gardens is an ideal gift for many occasions. Your relatives, friends, employees and customers interested in gardening will welcome such a remembrance and will enjoy the privileges to which it entitles them. Throughout the year each issue of *The Green Thumb* magazine will be a pleasant reminder of your thoughtfulness. Plan now to include memberships in your Christmas gift list. An appropriate card announcing your gift will be sent to the recipient.



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DECEMBER

Vol. 19

No. 10



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THE COVER

Wreath of cones, fruits and seed pods
by

Mrs. J. V. Petersen



CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent
Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT THE BOTANIC GARDENS HOUSE

DECEMBER

- | | |
|---|---|
| 3 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee | 10 — Monday, 10:00 a.m., Judges' Council |
| 5 — Wednesday, 7:30 p.m., Botany Club | 11 — Tuesday, 10:00 a.m., Herbarium Study Group |
| 6 — Thursday, 7:45 p.m., Orchid Society | 12 — Wednesday, 7:30 p.m., Landscape Contractors |
| 7 — Friday, 10:00 a.m., Civic Garden Club, Christmas Bazaar & Program | 19 — Wednesday, 9:30 a.m., Fun with Flowers Workshop |
| | 20 — Thursday, 10:00 a.m., Around the Seasons Club Meeting and Christmas Buffet |

Books and Booklets For Sale

The following publications are available for purchase in the office at Botanic Gardens House, 909 York Street:

Around the Seasons by S. R. DEBOER.....	\$1.00	
Colorado Evergreens by ROBERT E. MORE	2.50	
Colorado Wild Flowers by HAROLD and RHODA ROBERTS (a museum pictorial).....	1.25	
Fruit Key (identification of plants by their fruit) by WILLIAM HARLOW.....	.60	
Handbook of Plants of the Colorado Front Range by WILLIAM WEBER.....	5.00	
How to Grow Good Gardens in the Sunshine States by GEORGE KELLY.....	3.00	
Meet Flora Mexicana by M. WALTER PESMAN,	{ Thin card cover..... 4.00	
three-color:		{ Wir-O-Bound, thin card.. 5.00
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Meet the Natives by M. WALTER PESMAN	{ Regular	
		{ Spiral
Mountain Wild Flowers of Colorado by HAROLD and RHODA ROBERTS (a museum pictorial)	1.25	
Planning for America's Wildlands by ARTHUR H. CARHART.....	2.50	
Plants of Rocky Mountain National Park by RUTH ASHTON NELSON.....	1.10	
Saga of a Forest Ranger by LEN SHOEMAKER	5.00	
The Secret of the Green Thumb by HENRY and REBECCA NORTHEN.....	5.00	
Twig Key (identification of trees and shrubs in winter) by WILLIAM HARLOW.....	.60	
Also available is a mimeographed partial list of the flowering plants of the Mt. Goliath Alpine Garden Trail Area, compiled in 1962.....	.40	

Large shade trees — Fruit and ornamental trees

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Notes and Notices

HATS OFF — Sincere thanks from Denver Botanic Gardens are extended to:

1. Mrs. Schoo for her generosity in donating plants for a sale in connection with International Festival held at International House, September 29-October 7. Proceeds from the sale were divided between Denver Botanic Gardens and International House.

2. "Around the Seasons" Garden Club for demonstrating dried arrangements at International Festival.

3. Denver Botanic Gardens Junior Committee members who manned the plant sale booth at International Festival.

4. Dr. Richard G. Beidleman for his fine talk Oct. 15, "A Biohistorian in England," sponsored jointly by Denver Botanic Gardens and the State Historical Society.

5. The Editorial Board of *The Green Thumb* would like to take this opportunity to thank all of you who have contributed articles, illustrations or photographs during the past year. Your support has made a well-rounded and informative magazine possible.

CHANGE OF ADDRESS — Please notify us as soon as possible when you change your address. This saves you delay in receiving your copy of *The Green Thumb* and saves us the expense of remailing.

NOTICE TO GARDENERS — Will you share your ideas with us? Have you raised an unusual plant, tried some new cultural method? Write and tell us what you have done — let us share your ideas with others through *The Green Thumb*.

AFRICAN VIOLETS AND CACTI FOR SALE — Mrs. Jan Schoo, who has been an enthusiastic grower of African violets for years, is continuing to sell many of her lovely plants. The cacti are from the collection of Mr. Schoo. This is an excellent opportunity to add to or start your own collection. Telephone for appointment: DE 3-1249. Mrs. Schoo is dividing the proceeds from this sale between Denver Botanic Gardens and International House.

KATHRYN KALMBACH HERBARIUM — Persons wishing to use the Kathryn Kalmbach Herbarium can have help from the members of the Herbarium Committee between 10 and 2 on the second Tuesday of each month.

NEW OFFICERS ELECTED — Newly elected officers of the Denver Rose Society are: President — Mr. G. E. O'Donnell, 1st Vice President — Mr. Jack Faust, 2nd Vice President — Mr. E. O. Nord, Secretary — Mrs. T. M. Rutliff, and Treasurer — Mrs. Herbert King. Recently elected officers of the Colorado Federation of Garden Clubs, Inc., are: President — Mrs. Vivian Christensen, Denver; 1st Vice President — Mrs. Vane Schierbaum, Denver; 2nd Vice President — Mrs. W. M. Fleischer, Pueblo; 3rd Vice President — Mrs. John Scott, Englewood; 4th Vice President — Mrs. Esther Holtz, Boulder; Recording Secretary — Mrs. Earl McMullen, Estes Park; Corresponding Secretary — Mrs. Donald Moss, Wheat Ridge; Treasurer — Mrs. Joe V. Carroll, Lakewood; Auditor — Mrs. Maurice Johnson, Arvada; Parliamentarian — Mrs. F. S. Mattocks, Boulder.

MEETINGS — The Turf Grass Conference held October 8 and 9 at Fort Collins was attended by 145 people from the Rocky Mountain area who are involved in growing grass commercially or otherwise.

Land and People's Conference was held in Denver October 8 and 9. This was one of five regional conferences held under the auspices of the United States Department of Agriculture. The conference highlighted problems of rural areas, particularly rural and urban interdependence and planning.

MARSHALL NURSERIES

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Christmas Trees

FRED R. JOHNSON

CHRISTMAS TREES are gradually developing into an important farm crop rather than coming largely from wild forest land, as in the past. About 52% of all green Christmas trees used in 1960 came from farms, according to a review of 1960 Christmas tree data prepared by Extension Forester A. M. Sowder of the U. S. Department of Agriculture. This report appeared in the November 1961 issue of the *Journal of Forestry*.

An Artificial Christmas Tree

Poem by Woodbridge Metcalf
Berkeley, California

I think that I shall never see
A thing as ugly as this "tree."
Instead of needles soft and green,
It has a harsh, metallic sheen.
The branches fold, its trunk is square;
No bird has ever nested there;
No fragrance as of pine or spruce,
Pervades the air throughout its use.
It never felt the gentle rain,
The season's change on hill and plain,
Or sensed the tender loving care
Provided in plantations where,
Under the grower's watchful eye
The green trees thrive beneath the sky.
This thing of metal's not for me
I want a green and fragrant tree.

Reprinted by permission from American Forests,
December 1961.

The report revealed that 31,361,500 trees were harvested in the United States for use during the 1960 Christmas season — nearly 24% more than in 1955. The value of these trees in the woods (stumpage) was nearly \$20 million. Their retail value is given at \$85 million.

In addition, 10,688,000 trees were shipped from Canada. This makes a total of slightly over 42 million natural trees used in 1960 Christmas celebrations. This represents an increase of about 9% over the 1955 use, and is rather interesting in view of the increasing use of artificial trees.

Douglas fir is most widely used for Christmas, comprising about 23% of the total production. Montana is a

leading producer of this species and in 1960, 3,200,000 trees were shipped from Montana to 25 states. However, the outstanding feature of this study is the fact that 5,434,000 trees, 17% of the total production, were Scotch pines. Norway or red pine accounted for 10% of the harvest, and these two species were largely planted on farms.

Balsam fir was in third place in production — 17% of the total. This species came mostly from the Lake States and New England, presumably from wild forest lands. Eastern red cedar represented 8% of the total, with black and white spruce at 5% each. Then came white fir, white pine, Norway and red spruce and 19 other species that made up the remaining 8% of the harvest. Our native Engelmann and blue spruce, alpine and concolor fir, lodgepole and ponderosa pine are included in this miscellaneous group of species.

About $\frac{1}{3}$ of the trees harvested for Christmas in the United States came from the Lake States. There are many plantings of Scotch and Norway pine in this area. Michigan alone reported over 10,000 Christmas tree growers. The Department of Agriculture report states that there are over 625,000 acres of privately owned land devoted to the growing of Christmas trees in the United States. The Pacific coast and Northwest states, including Montana, harvest about $\frac{1}{4}$ of the total. The Northeast and Middle Atlantic states produce about $\frac{1}{5}$ of the harvest. The Southern Rocky Mountain states, including Colorado, harvested 794,000 trees, or only about $2\frac{1}{2}\%$.

There are no figures available for trees cut in Colorado for Christmas use, except for the Colorado National Forests, which produced 51,000 trees during 1961. This brought in a revenue of \$23,772 or about 46¢ a tree.

All Christmas trees cut on National Forests bear the traditional red tags, stating that the trees were cut on National Forests for the improvement of the stand.

The Colorado State Forest Service in 1953 discontinued the tagging of trees cut from privately owned land, because there is no law in this state regulating the method and amount of cutting permissible on such land. As a result there are no figures available on the number of trees cut on privately owned land in Colorado nor are there any estimates on the number of trees shipped into Denver from outside the state. In 1961, 71 licenses were issued by the Police Department to vendors for the sale of Christmas trees in Denver. The vendor pays a fee of \$75 and, in addition, must purchase tags on which are stamped the words "Certified Christmas Tree Dealer." There is no inspection of cutting areas or of



Photo by U. S. Forest Service

Christmas trees being graded as to size and quality as a basis for fixing price to be paid by purchaser. A red Forest Service Christmas tree tag is being tied to each tree, certifying that its cutting was not destructive. Pike National Forest.



Jarre Canyon Christmas tree area, Strawberry Creek. Douglas fir before thinning.



Jarre Canyon Christmas tree area, Strawberry Creek. Douglas fir immediately after thinning for Christmas trees.

Photos by U. S. Forest Service

A Douglas fir stand
near Indian Creek
Ranger Station, Pike
National Forest.
This stand was thinned
for Christmas trees
in 1918. Picture
taken in 1948.

trees. Many poor quality trees are shipped into the Denver market, especially during the past few years, because of the damage inflicted by the spruce bud worm to Douglas fir.

Every year there is a great outcry regarding the number of trees unsold and discarded after Christmas. Undoubtedly most of these trees are culls. Certainly we do not advocate waste. Perhaps the least that can be said for this situation is that, if the trees are thinned from the stand in accordance with good forest practice, their removal has served a useful purpose. Moreover, the number of trees discarded is small compared with the actual number used.

The number of culls is small in forest plantations, as the trees are spaced properly when planted and cut from year to year as their size and shape warrants. Assistant State Forester Dale L. Shaw states that high quality Christmas trees are becoming scarcer each year. Undoubtedly the increase in the number of planted trees for sale will remedy that situation.

Tree plantations on farms serve another useful purpose. They put idle land to work, remove surplus agricultural cropland from production in accordance with the agricultural conservation program, and provide a supplemental annual income to the farmer.

Some persons are concerned at the increased use of artificial Christmas



Photo by U. S. Forest Service

trees. Our feeling on their use is best expressed by Woodbridge Metcalf in the poem, "An Artificial Christmas Tree," reprinted by permission from the December 1961 issue of *American Forests*.

Manufacturers predict the gradual replacement of green Christmas trees by the mechanical kind and hail this as a conservation measure. Aside from the aesthetic and sentimental value of green trees, as expressed in the poem, their harvesting in accordance with good forest practice is good conservation. Moreover, they will be increasingly grown as a farm crop and will thus help to solve the farm problem with its billion-dollar surplus of unused food.

Trees, of course, are a renewable crop in contrast with aluminum from bauxite, a non-renewable mineral.

The Biggest Christmas

TREE

MRS. EDMUND W. WALLACE

SUDDENLY, one night in the Christmas season of 1960 in southeast Denver, there appeared in the evening sky a gaily decorated Christmas tree, taller than the tallest church spire. When one first saw it lighting the sky above the surrounding buildings, he wondered from where such a tall, perfectly formed tree could come — and how it could be held upright at such a tremendous height. Bright lights cascaded from its 212-foot top in lovely symmetrical pattern. At dusk they seemed almost ethereal, hanging palely lit so high in the heavens. Later, their brilliance against the darkness made a spot of Christmas that could be seen from many miles away.

This delightful surprise was the work of the Frohlick brothers, Alfred and George, who tried something new in Christmas trees and succeeded. They first displayed the “tree” at their place of business on East Asbury and South Dahlia. This “tree” was a gigantic crane with cables suspended from its great height. This amazing landmark received such acclaim that the following year it was placed at the corner of Yale and South Colorado Boulevard with nearly twice as many lights, which made it the dominating feature of the entire section. The story of the shining tree was told to a reporter as follows:

“I first thought of something like this when I was in Detroit before

Christmas of 1959,” said George Frohlick, of the Frohlick Crane Service. “A large Detroit building had strings of lights running downward from the top to the doorway. I noticed it, but wasn’t too impressed.”

Later, however, Mr. Frohlick viewed the building lights differently. He was across the Detroit River in Windsor, Canada. A fog dimmed the building shape until only the bright lights were visible.

When he came home his brother, Alfred, of 4840 East Atlantic, remarked, “While you were gone I almost strung some Christmas lights on the big crane.”

“I’ve got a better idea,” George declared. “Let’s suspend cables from the top of the boom in the shape of a tree and string colored lights to the ground.”

That’s just what the Frohlicks did, to the admiration of area residents. Last year it was moved to the corner of East Yale and South Colorado Boulevard under the sponsorship of the University Hills merchants, where it will be again this year.

According to the Frohlicks, the 60-ton crane, with a 225-foot boom, is the largest in the Rocky Mountain area. As far as they know, it’s the only crane anywhere that joins in the yuletide spirit by holding up a “Christmas tree.”



The 1962 Season in

THE WASHINGTON PARK FLOWER GARDEN

FRANCES NOVITT

Landscape Architect, Denver Park Dept.

THE LARGEST DISPLAY of flowers in the Denver parks is in the Washington Park Flower Garden, which can be seen along South Downing Street, beginning just south of East Center Ave. It covers between three and a half and four acres. There are 54 large flower beds informally arranged, with graveled paths leading the visitor around through the garden.

The garden was designed by S. R. De Boer, who was consultant landscape architect to the Denver Park Department for many years. It was established about 1918, and was planned as a perennial garden; large plantings of iris, peonies, lupines, phlox, chrysanthemums, asters, etc., were displayed. The perennials were re-established as they died out, of course, but over the years more and more annuals were used in the garden, until today it is primarily an annual garden with early blooming perennials such as iris, peonies, lupines, yellow alyssum, and late chrysanthemums and asters extending the blooming season to the maximum. The beauty of the garden at the present time is due to the enthusiasm, skill, and hard work of many people, including Russell Ellenbaas, supervisor of Washington Park, Byron Mier, head gardener, Mike Ulaski, supervisor of the City Park Greenhouse, and their crews.

The garden is so large that we use a theme of colors as the basis for arranging the plantings. For example,

this summer, the central part of the garden, some long rectangular beds around an open grass panel, has had a striking combination of rich lavender-colored *Verbena venosa*, with blocks of yellow Golden Bedder Coleus. The beds around this display were carefully related to it, using a beautiful light pink geranium — *Geranium Pink Cloud* — having corner blocks of the same yellow coleus. The same theme is carried out farther away from the center, with variations in tints and shadings, using different plants for different effects. Finally these variations were developed into localized color areas in the outer sections of the garden. For example, the north end of the garden was intended to have a blue theme. All kinds of blues were used — pale blues, dark blues, and blues shading toward the reddish tones — lavenders and purples. These were set in fields or borders of other colors contrasting with them, or variations. In some of the beds, where it was practical to do so, the central area and the bordering area were designed with definite interlocking shapes, so that there was not only color to look at but a design area to see, and so that, in tall beds, one could be surprised by walking around to the other side, in seeing a different shape, or a different variation of the main color.

Within the general garden plan, we tried to include a wide variety of plants, because variety provides many forms and textures, which are important de-

sign elements. This garden is a good place to introduce new varieties of flowers. We have the benefit of the experimental annual plantings at the Denver Botanic Gardens, at 9th and York Streets, and also the yearly "All America Selection," which are awards made to good new varieties of annuals and perennials on a national basis. The new ornamental Basil Dark Opal, an All America Bronze Medal winner for 1962, proved very effective as a border plant, and we are making plans to use it in various other ways and in other

areas next year. Some of the newer varieties of petunias which were outstanding this year were Brass Band, a true yellow; Mercury, a fine light blue; Sugar Plum, and Lavender Lace. Vinca Coquette, a new variety of the old-fashioned periwinkle, was a newcomer this summer. It is a small compact plant with rosy blossoms and shiny dark green leaves, and it thrived in the hot summer weather. Snapdragon Venus, a new giant double hybrid, a delicate pink with yellow lip, was outstanding.



THE M. WALTER PESMAN ALPINE TRAIL

IN M. WALTER PESMAN, professionally a landscape architect of wide renown, we have a friendly fellow-gardener, stimulating teacher, scholar, and author who sets an example of toil and achievement that few can match. His newest book, *Meet Flora Mexicana*, reviewed in this issue, is the fruit of years of research and preparation. Its recent publication provided a fitting occasion for the Board of Trustees of Denver Botanic Gardens to take an official action as an expression of its appreciation and gratitude for the many years of loyal service Mr. Pesman has given to teaching an appreciation of the natural landscape and to urban landscape beautification.

By a resolution passed by the Board of Trustees, our alpine trail on Mount Goliath will be named "The M. Walter Pesman Alpine Trail." A bronze plaque has been cast and it will be permanently fixed to the stone trail guide at the upper end of the trail.

This speaks for hundreds of your former students and other friends, Walter, in thanking you for helping us to "meet the natives" and have greater appreciation for *Flora del estado de Colorado*. We will all want to be heading to Mexico with a copy of your latest book.

M. WALTER PESMAN ALPINE TRAIL

DEDICATED AUGUST 1962

HE MADE NATIVE PLANTS OUR FRIENDS



Photo courtesy of
Florists' Telegraph
Delivery Association

OF ALL THE Christmas plants, that old favorite, the poinsettia, is surely the most popular. Its cheery red is so much a part of Christmas that it is a favorite subject for cards, wrappings, and decorations, as well as being the top house plant for the holiday season.

Although we know the poinsettia as a house plant, it grows as a branching shrub two to ten feet high in its native habitat: moist, shaded parts of southern Mexico and Central America.

The bright red petals for which we know the poinsettia are really not petals at all, but modified leaves known as bracts. The inconspicuous clusters of yellow in the center of the bracts, which

Poinsettia

Care

HELEN MARSH ZEINER

most people think of as the center of the red flower, are actually the true flowers. Not all poinsettias have red bracts — those with white and yellow bracts are commonly seen on the market, and there are also a variety of varying shades of rose and red. At Christmas time, however, the old-fashioned bright red is the favorite.

Many of you will have poinsettias in your home during the holidays. With a little care they can be long-lasting plants. When your poinsettia arrives from the florist, put it in a sunny location where it will be out of drafts and not subject to sudden drops in temperature. Keep it uniformly moist and never let the soil dry to the point where the plant wilts. These precautions should give you a maximum period of pleasure from your plant. Sooner or later, however, the leaves will drop. Then, if you wish to keep the plant for another year, give it a rest period. A good way to do this is to put it in a cool, dark basement and keep it dry. About May cut the plant back severely, repot in a fairly light soil containing a good proportion of leaf mold or peat and sand or vermiculite, and sink the pot in a sunny part of the garden when danger of frost is past. During the

summer the poinsettia requires no special care except to be kept moist. In August, again prune severely. Bring indoors before frost, place in a sunny location, keep moist and out of drafts and feed about once a month with a good plant food of your choice. Since these plants in their native habitats have become adapted to bloom during the short days of the year, budding is encouraged by protecting the plant from artificial light from about the 20th of September until buds form. This can

be done by covering the plant with anything that will shut out light and thus shorten the day. It is recommended in a lighted room that plants be covered by late afternoon. They should have no more than 12 hours of daylight. Night temperatures of about 65° are advised. With these precautions, chances of Christmas bloom are good. If they do not bloom, however, they are still very attractive foliage plants and make a nice addition to the window garden.



SCOOPS BY SCOTT

MRS. JOHN SCOTT

LAST MINUTE shopping stampedes, accompanied by aching joints, fatigued feet and ravelled nerves are unknown holiday hazards for you gardeners who propagate your own. All you have to do is to slip a holiday wrapper around the pot of a colorful coleus or flowering amaryllis. Speaking of amaryllis, Amaryllis Christmas Joy does bloom in five weeks, as advertised. Then, there's the paperwhite narcissi and other forced bulbs to help continue the Christmas cheer.

Pots of parsley will kill the odor of any excess Christmas cheer, in case you don't want your liquid tastes aired. Don't eat the pot, just the parsley, and a pinch will do the camouflaging. The herbists really pep-up any sagging spirits with their spices for seasoning and fragrances for scenting. Perhaps you jarred some crabapple jelly, or pickled peaches. Vegetables taste good, too. Any hubbard squash, marble variety?

No one is able to promote gardening better than gardeners. Christmas is just another season to share your successes and enthusiasm. How about that extra rose or shrub your garden no longer needs? Send a Christmasy note, along with a picture of the plant (clipped from last year's seed catalog) with a promise to deliver the gift plant near planting time. Include some suggestions as to space, exposure, soil and culture needs. You just don't uproot a plant without giving hints as to how to make it live happily in its new home. Any lore or cleverness (rhymes or acrostics, etc.) or cartooning on your note will add to this gift plant's anticipated acceptance.

And while you're writing, remember to send your green thumb Christmas greetings to any publications in your area that have printed garden articles.

Newspapers, in particular, need to realize that gardening is a billion-dollar business and a year-round activity. A gardening gift would be an even better reminder. Plants may not survive office care, but a design or plaque from dried plant materials should. Not only will the newspaper staff appreciate being remembered, but everyone who drops in will see your artistic gift and be interested. This is another timely way to spread the gardening arts and crafts.

Another interesting way to speed goodwill is to arrange fruit in a basket or on a board. You could add some nuts, candies in cellophane wrappers (bunch them like grapes or make into a flower), berries, holly, etc. Be careful to limit your plant materials to five or less kinds. This is not a rule, but a safe guide. Otherwise you might have a sample of everything in the supermarket competing for attention, with design taking the hindmost.

A membership into some plant society in which the person has shown interest is a forethought, even at the last minute. Most plant societies print a quarterly and many have a publication every other month, plus a yearbook. The memberships are usually under \$5.00 a year. I'd like a half dozen of these myself. (Wasted hint! "Mom's stuff" is not read by the family.)

A book is always welcome. *Gifts from the Garden* by Suzanne James, has 54 photographs and 25 drawings. Its scope will amaze you, from mobiles for children to gift wrapping from seed packets and seed catalogs. Along with the unexpected, it covers the expected — in a new light, of course, or there would be no reason to write a book. Better buy an extra copy of this 1961 book for yourself.

Now that you've armchaired the seasonal shopping daze, you won't be too pooped to participate in all the festivities when the great day arrives.

Here's wishing you a relaxed Christmas and a happy gardening New Year.

Bonsai



Show

The Denver Bonsai Club held its fifth annual Bonsai Show October 6 and 7 in the main lobby of the Denver United States National Bank. This was a noncompetitive show in which both Bonsai (rooted, living plants sometimes known as "tray trees") and Ikebana (flower arrangements) were displayed. Several hundred exhibits were on display, contributed by 25 exhibitors in Bonsai and 30 exhibitors in Ikebana. Plant materials used in the Bonsai exhibits included native ponderosa, limber, and lodgepole pine, blue and Englemann spruce, juniper and fir, as well as exotic plants such as ginkgo, Japanese maple, holly, azalea, Japanese pine, hemp palm, and pomegranate. A great variety of containers, including natural rocks, were in many cases set off by natural wood bases. Displays ranged from miniatures a few inches high to others two to three feet high and many years old. All showed the care and patience that goes into the training of a beautiful Bonsai tree.

Ikebana displays, with emphasis on beauty of line, used a wide variety of materials and containers. Various schools of flower arrangement were represented, including Ikenobo, Moribana, Tosen, Nageire, and others.

Those interested in Bonsai or Japanese gardens may obtain information from George Y. Inai, President of the Denver Bonsai Club, or George T. Fukuma, Vice President.

The CHILDREN'S GARDEN PROGRAM for 1962

A. C. HILDRETH

THE CHILDREN'S GARDEN PROGRAM conducted by the Denver Botanic Gardens has passed its third year. Profiting from previous experience, we were able to improve this season's program in many ways, thus making it the most successful one to date.

This year 106 children grew their own gardens and received certificates for satisfactory completion of the work. Of this number 87 were beginners and 19 were repeat performers who had participated in last year's program. An inventory of the plants in their gardens showed that 20 different kinds of vegetables and 18 different kinds of flowers were grown. This means that, collectively, this group of children gained experience with 38 different species of cultivated plants, not to mention a large number of pestiferous weeds.

Impressive as these statistics are, they give little idea of what this program actually meant to these children. This can be fully understood and appreciated only by those who were privileged to observe the activities and reactions of these youngsters from day to day as they went about the business of growing gardens.

The eagerness with which each awaited assignment of a plot (his very own!); the zeal with which they tackled the hard work of preparing the soil; the hopeful watching for seedlings to spring up from carefully planted seeds; the joy with which the first mature

vegetable was greeted (and often eaten on the spot); the pride with which the harvests were carried home; and the look of satisfaction on the faces of the children when their achievements received public recognition at the graduation exercises — all this was ample evidence that gardening was a worthwhile experience for these children and that not all of its values could be expressed by figures.

From the standpoint of the community and of the parents concerned these children had a summer of wholesome activity out-of-doors in the fresh air and sunshine. They also had plenty of constructive work to keep their active minds and restless hands busy. There are no juvenile delinquents among junior gardeners.

Enrollment of the gardeners was on a basis of "first come, first served". Children who participated in last year's program were given first opportunity. Of these 19 enrolled for the second year. New enrollees were limited to children in the 4th, 5th and 6th grades of school. Invitations were issued through Denver newspapers. Soon there were more applications than there were garden plots and a waiting list was established. As usual, however, some of the children dropped out, for one reason or another, and eventually everyone on the waiting list got a plot.

A fee of 50¢ was charged each gardener. This was partly to help cover cost of seeds, bulbs and plants and



Children's

Garden Program

for 1962



partly to give the child a feeling of partnership in the program. Land, irrigation water, tools and supplies were provided by the Botanic Gardens and the soil was fertilized, plowed and harrowed by our labor crew. Instructors were members of our technical staff. There were no charges for these facilities and services.

Each gardener was given a copy of the rules governing his personal conduct and the care of his plot and was required to sign an agreement to obey these rules. Parents were required to sign an agreement expressing willingness to have their children participate in the program and intent to encourage the children to comply with the rules and to carry out instructions of the supervisors and instructors.

In spring, long before the weather would permit work in the garden, the children were given instruction indoors. There were discussions on arranging the garden, the nature of seeds, bulbs and plants to be planted, a practice class on testing seed for ability to germinate and demonstrations on the use of tools, their safe handling and their care.

The children drew lots for their plots. Beginners' plots contained approximately 140 square feet and second-year gardeners' plots were somewhat larger. With the assistance of the instructors, each gardener planned, planted, irrigated, cultivated and weeded his own plot and harvested his crops. He also kept the bordering pathways and fence rows free from weeds. Each gardener was provided with seeds, bulbs and plants sufficient for his plot and was given some leeway in choosing what he should grow. He was permitted also to provide and grow other kinds of vegetables and flowers if he so desired. Every gardener was encouraged to grow several

different kinds of flowers and vegetables in order to gain experience with a wide variety of plants.

An essential part of the Children's Garden activity has been the committee of supervisors. This is a group of devoted people who volunteer to supervise the children during the hours that the garden area is open. This year's committee was under the capable leadership of Mrs. James Layden. Other members of the committee were Mrs. Joseph Bartley, Mrs. Harry Berman, Mrs. Ben Bozeman, Mrs. W. D. Brunton, Mr. and Mrs. James Buchanan, Mr. Wm. Buchanan, Mrs. J. W. Craighead, Mr. Richard Dolberg, Mrs. Teddy Eha, Mrs. Robert Ferrese, Mrs. Giles Filley, Mrs. Leonard Gemmil, Mrs. Eleanor Harned, Mrs. Earl Kenney, Mrs. John Knodell Jr., Mrs. Bernard Lips, Mrs. Edward Lupberger, Mr. Howard Martin, Mr. Wm. McLelland, Mrs. Carl Olson, Mrs. J. R. Probert, Mrs. M. Replin, Mrs. H. W. Reynolds, Mrs. H. F. Stagner, Mrs. David Stephenson, Mrs. C. F. Weeth, and Mr. and Mrs. W. E. Woodward. Three Junior Red Cross Aids, Leslie Pogrew, Rose Marcus and Sally Lindsay, under the general direction of Mrs. Richard Cooper, gave valuable assistance to the Children's Garden by helping the supervisors and doing typing.

Without the assistance of these public-spirited citizens Denver Botanic Gardens could not have carried on this important phase of its educational work.

The support given the Children's Garden Program this year by business firms was most gratifying and contributed materially to its success. Hannigan Floral Company donated plants of flowers and vegetables for planting in the children's plots.

Mr. Robert Collier of The Arboriculture Service and Supply Company

lent spray equipment and furnished chemicals as needed for the control of insect pests.

The American National Bank provided fine leather billfolds as prizes for the best gardens.

Perhaps of greatest appeal to these young gardeners was the Seven-Up Club sponsored by Bill Howell of the Seven-Up Bottling Company. Membership in this club was limited to enrollees in the Children's Garden Program. Each gardener was required to pull up seven weeds each day he came to work on his plot. Every month members of the club in good standing were treated to Seven-Up. Largely because of this incentive, the plots this year were freer of weeds than ever before.

GARDENS FOR DEAF CHILDREN

Gardens for deaf children was a new feature of the 1962 Children's Garden

Program. Of the total of 106 enrollees this season nine were deaf children from Evans School. The Open Gate Garden Club sponsored this venture through their garden therapy project. Project chairman, Mrs. Charles Harden, deserves chief credit for the success of this activity.

It was Mrs. Harden's opinion that the handicapped children should be isolated from the normal children. Accordingly, a tract of land in another part of the garden at 909 York Street was set aside for this project. Mothers of the children acted as supervisors. Deafness proved to be no handicap in gardening and the gardens of these deaf children compared favorably with those of the normal ones.

Parents agreed that this venture into gardening had been of great value to their afflicted children and expressed the hope that the project would be continued next year.

Reserve Exhibit Space Now!!!

4th ANNUAL

Colorado Garden & Home Show

March 30 - April 7, 1963

National Western Bldgs. — Denver



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\$1 Adults, \$.25 Children (Age 6-12)



For Exhibit Space Reservations:

Contact DICK HAUGHTON, Gen'l Mgr.

502 Mining Exchange Bldg.

Phone: AC 2-9861 or AC 2-8372

Denver 2, Colorado



Orchid Show

The 1962 Orchid Show was held at Botanic Gardens House October 6 and 7.

Approximately 1500 people attended. One hundred and twenty-one orchid plants representing several genera were exhibited by the Denver Orchid Society. Commercial displays included cut blossoms from San Francisco, California, and a display of black orchids from Fort Collins which aroused much speculation — were they real or not? In actuality, these were real orchids which had been dyed black. A clever display, "The Diners' Club," was arranged by Mr. and Mrs. Richard Helmer, St. Louis, Mo., to show that "bugs can be cute."



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Merry Christmas and Happy New Year

FROM

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Pete Ponders



Dear Lively One,

During a recent illness I received a minature orange tree as a gift. The colorful tiny fruit and fragrant blossoms are delightful, but the leaves are curling and seem a little yellow. So far it has retained flowers, fruit, and leaves. Can you help me?

KEEP-IT-LIVELY

Dear,

Let's keep it lively by heeding the advice given by Bill Gunesch, psychologist to thousands of tropical plants thriving in glass-houses on West Hampden. Curling leaves indicate aphids, so spray with pyrethrum, rotenone, or nicotine-sulphate. He prefers the first two since they are non-toxic to warm-blooded folk. Yellowish leaves suggest the plant is over-watered or underfed.

According to Mr. Gunesch, miniature oranges need all the light they can get and they prefer a temperature of 70°. As for water, he warns the amount given depends on the size of plant, the amount of light, and temperature. Soil should be neither soggy nor dry but kept uniformly moist. (See what I mean by psychology?) Food should be supplied in direct proportion to the amount of water. If the plant is watered once a week or ten days then feed at monthly or six-week intervals. Use any good fertilizer, preferably one containing chelated iron to correct chlorosis or yellowing foliage.

Vive l'orange, and a happy recovery to you!

Dear Pete,

What about using balled evergreens as indoor Christmas trees? Many garden magazines picture this suggestion annually, but should we do it here?

IMA DOUBTER

Dear Miss Doubter,

"Absolutely not!" is Stan Brown's response to your question. Mr. Brown, of the Alameda Browns, echoes the opinion of nurserymen and many authorities on plant growth in this area.

He has found through repeated experience that by selecting hardiest varieties, digging the receiving hole well in advance (to eliminate the possibility of frozen earth at planting time), and warning the buyer the tree should remain indoors a minimum period, the plant has survived only in one instance and after three years that tree is still struggling for existence. Mr. Brown explains that even the hardiest variety, either balled-in-burlap or container-grown, fails to adjust when subjected



THIS OR THIS?

to 70° to 75° temperatures in our arid homes and then suddenly bounced outdoors, perhaps into minus 10 degrees. Even if the tree were moved to a cool garage or basement and transferred outside in earliest spring it has still received a false stimulus.

He suggests that if you must purchase a live tree, select a variety that responds to repeated pruning and plant it directly outdoors for Christmas tree use in later years. Better yet, plant an outdoor tree for outdoor decoration, or visualize a standard Christmas tree as a symbol of the tree you plan to plant this spring.

Doubt no longer, Ima.

Birds in your Winter Garden

POLLY STEELE

WINTER IS AN interesting time to observe birds. With a varied menu and the right conditions they can be attracted to your garden for many pleasant hours of watching. It seems that many birds are less wary in winter. These are the months observation is facilitated by the absence of foliage on our deciduous trees and shrubs. Donald M. Thatcher, Colorado Bird Club, points out: "Winter is a good time for the beginning birder to start, when there are fewer kinds to confuse him than at other seasons. And to the experienced birder, winter is the most likely time for "surprises"—unexpected birds or unusual numbers." (See the Jan.-Feb. 1958 *Green Thumb*, Winter Birds of the Denver Area.)

What are some of the food items to offer at your feeding station? We almost said shelf but that is not inclusive enough. Many of the finches and sparrows like to feed on the ground. The most numerous of our sparrows, Mr. Junco, scratches and gleans under our shelf. There is always one that works so hard for his living. What fun to know a few individuals that visit regularly! Those acrobats, the gay chickadees, love to swing on a suspended piece of suet, often head down. On the other hand, the big, noisy, friendly Red-shafted Flicker and the two black and white woodpeckers, the Hairy and the smaller Downy, all seem to appreciate suet served upon a firm location, a post or strong limb. Start with a good mixture of wild bird seed with a generous amount of sunflower seed. Sun-

flower seed is a great favorite and no station can claim to be well stocked without it. Millet and many of the smaller grains are available at your local feed store. A mixture to your liking can be bought there. Your supermarkets offer very good ready-packaged mixtures.

Beef suet is a must on the menu. Ask your butcher to save for you some rather large chunks, a pound or more to the piece. Tie this down to your shelf or secure it in a tall shrub or on a tree limb. Strong twine tied many times around the chunk (make almost a string basket) makes a safe holder and will prevent some of the larger birds from carrying the suet off. Wire or metal holders may injure the eyes and feet of the birds in freezing temperatures; remember how your wet fingers stuck to that metal door





latch. The Red-shafted Flicker runs his long tongue over the suet to collect any loose crumbs.

Bacon or any kitchen fat, as long as it is free of excessive salt, may be poured over nut and seed mixtures in coconut shells. Hang shells in a shrub or fruit tree.

Do not harvest all your apples, grapes, or small fruit. Robins, Bohemian Waxwings and their smaller relatives, the Cedar Waxwings, will be attracted to these delicacies. Raisins and most dried fruits are good items. Mr. and Mrs. Fred Shortt of Boulder had a flock of Bohemian Waxwings visit them last year. Like the "Man Who Came to Dinner" they came and stayed, and stayed — and ate over fifty pounds of raisins.

We do not feed bread crumbs because it attracts such large numbers of the English (or House) Sparrow. With a severe storm come the usual TV and

radio reminders to "Feed the birds." Then great quantities of bread are offered by kind-hearted people.

Peanuts and mixed nuts (it is a good way to use those that have grown stale) may be fed. If they are heavily salted put them in a sieve and run water over them — then chop.

Some DOs and DON'Ts:

DO discourage squirrels and cats.

DO put most of the feed up off the ground.

DON'T place food around heavy, low shrubs such as evergreens where a cat might hide.

DO place your feeder where it can be observed from the most lived-in room in your house.

DO keep binoculars handy.

DO have feeders at a convenient height to reach.

DO continue feeding, once started. Food suddenly withheld can cause great suffering.

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Manzanita (*Arctostaphylos patula*) grows in southwestern Colorado, with smooth red bark, evergreen leaves and with little apples, *manzanitas* in Spanish. (Patula is spreading.)

P.S.: Do you know the meaning of *pulcherrimum?* *vulgaris?* *sativus?* *scoloporum?* *salsuginosus?* The next issue of *The Green Thumb* will help you in the NAME GAME.

A Denver Botanic Gardens membership is an appropriate Christmas gift for a gardener friend. Each issue of *The Green Thumb* will be a reminder of your thoughtfulness.

Merry Christmas to
All Our Advertisers
With Thanks

Schulhoff

Season's Greetings

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ANYONE WHO is planning a trip to Mexico and who is interested in plants should become acquainted with *Meet Flora Mexicana* by M. Walter Pesman.

This book was written to meet the need of the average person traveling through Mexico, especially during the winter months. Mr. Pesman, while traveling in Mexico, encountered numerous difficulties in finding the names of common and conspicuous plants seen along the way. As a result, *Meet Flora Mexicana* was written to help others in the identification of Mexican plants. Although written to aid the amateur, *Meet Flora Mexicana* is a very carefully prepared and scholarly book.

The general plan of the book is like that of *Meet the Natives*, Mr. Pesman's book for easy identification of Colorado plants. Plants are grouped according to zones in which they are commonly found, such as desert, pine-oak forest, or thorn forest. Eleven zones are recognized. An ecological map showing these zones is included. To make it more useful a highway map is superimposed on the ecological map so that the traveler can readily determine through which zone he is passing.

Each plant is adequately and accurately described, and the botanical name is given as well as English and Mexican common names. Each plant description is accompanied by a pen and ink drawing which should prove an invaluable aid to identification. For many plants, Mr. Pesman has also included bits of information such as uses, which increase the interest of the book.

In addition to the treatment of native plants, a section on introduced and cultivated plants has been included. The visitor to Mexico who spends his time in one location should be appreciative of this section, since many culti-

BOOK REVIEW

Meet Flora Mexicana,

M. WALTER PESMAN

vated or introduced plants are to be seen in parks, on hotel grounds, or in home landscaping.

Worth reading by anyone, whether or not a visitor to Mexico, is the chapter on plant names. Botanical names, their meanings, and reasons for their use are discussed in an interesting manner. If you enjoy "The Name Game" in *The Green Thumb*, you will surely want to read this chapter.

The person with botanical inclinations who reads this book will be pleased to find that in the chapter "Family Register," Mr. Pesman has grouped all the plants described into families. For those interested in relationships, this is a fine addition. For those wishing to pursue the identification of Mexican plants further, there is an excellent bibliography.

From the attractive Mexican-theme cover to the well made and complete index, this is an interesting, informative, and easy-to-use book. Mr. Pesman has done a great service to all those interested in Mexican flora.

**A BLESSED CHRISTMAS
FOR YOU AND YOURS
AND A YEAR
OF HAPPINESS AHEAD**

"For unto you is born this day
in the city of David a Saviour,
which is Christ the Lord." LUKE 2:11

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LEE CHAMBERS

1594 So. Forest



TREE SURGEON

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COMPLETE CARE AND MAINTENANCE OF TREES, SHRUBS AND EVERGREENS

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Klinger, Bruno	211		
Koch, Ruth Reid	85		
Learned, Clyde E.	41, 77		
Legendre, Jerry	154		

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